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Scopi e quadro di riferimento

Scopo della rivista è quello di promuovere la ricerca scientifica in ambito cartografico nonché divulgare la cultura cartografica. Non tralasciando le tradizionali metodologie di produzione del formato cartaceo, il focus della rivista è oggi la cartografia digitale, con particolare riferimento alle sue interconnessioni con i GIS e il telerilevamento. La rivista ospita articoli dedicati a tematiche eterogenee, che hanno come comune denominatore la cartografia.

Aims and scopes

The aim of the journal is to promote the scientific research in the field of mapping. Besides, other targets are to teach and disseminate mapping issues. The traditional cartographic process remains one of the main topics. However, the today focus of the journal is the digital cartography. Particular attention is also paid to maps, GIS and remote sensing technology connections. Printed papers deal with different topics, having in common the topic of cartography and its main purposes.

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Introduzione al numero speciale "Cartografia, Geografia, Informazione Geografica. Rappresentazione, Visualizzazione, Analisi"

Introduction to the special issue on "Cartography, Geography, Geographic Information. Representation, Visualization, Analysis"

Prof. Giuseppe Scanu, President, Italian Cartographic Association

This special issue of the Bulletin of the Italian Cartographic Association contains a set of papers deriving from presentations in occasion of the IV EUGEO Congress, held in Rome on 5-7 September 2013, and particularly during the Session S04 on "Cartography, Geography, Geographic Information. Representation, Visualization, Analysis". Such session was organized by members of the Executive Board and of the Scientific Council of the Italian Cartographic Association, and was intended to gather contributions for members and non-members of the Association, both at national and international level.

A selection of the oral speeches presented was submitted as original papers in this special issue of the Bulletin of the Italian Cartographic Association and accepted for publication after a peer-review process of selection, as a standard procedure adopted during the last few years.

This special issue and the session that originated it, represented an opportunity to examine the link between Cartography and Geography, considering in particular the revolutions intervened with the advent of Geographic Information technologies (GIS, Remote Sensing and Global Navigation Satellite Systems) and, more recently, with the development of 'Web 2.0' and its geographical implications (Neogeography, Volunteered Geographic Information, etc.).

Geography and Cartography have been always tightly coupled together, in particular as Cartography allows the representation of geographical entities and processes. To-date Cartography is enhanced and integrated by Geographical Information instruments, now widely used and manageable by researchers and scholars. Some of the issues related to geographical data are being solved, thanks to the recent initiatives from the public sector (Open Data, Spatial Data Infrastructures), the private one (i.e. Google Earth) and the so-called Volunteered Geographic Information (i.e., Wikimapia, OpenStreetMap), possible through the wide diffusion of electronic devices containing geo-referenced information. Such availability of data and software allows scholars and researchers to cope with many issues concerning geographical analysis and representation. However, such availability raises also new challenges and open new issues in geographical analysis. The Eugeo 2013 S04 Session on "Cartography, Geography, Geographic Information. Representation, Visualization, Analysis" and the special issue therefore represents an opportunity for scholars to exchange ideas and experiences on issues related to geographical analysis and reasoning on the cartographic representation and visualizations that can originate from that.

This special issue is opened by the invited paper by prof. Christian Vandermotten, on "The Geography of the European Left from the end of WW II: national homogenization or permanence of the regional political behaviors?" in which the spatial pattern of European elections in time is analyzed, with reference to phenomena

as regional contrasts, homogenization, hysteresis and permanence. The analysis is mainly focused on the results of the Left parties, and the paper is based on a question as: Can the geography of the Left be explained, in a global European perspective ?

Afef Saada presents a paper on "The cartographic image of the Tunisian space seen from 'the West' in the modern age: historiographic and quantitative approaches (from XVI to XVIII century)" where she addresses the perception of the Tunisian space from a Western point of view, by means of the cartographic representation in the modern age, using a storiographic and quantitative approach. The evolution of modern Cartography is analyzed thanks to software for the analysis of the distortions of maps realized in different times and the comparison with the map models.

Yoann Doignon and Sebastien Oliveau focus on "Territorial grids in the Mediterranean: space versus population", where the authors focus on international comparisons on a Mediterranean scale for demographic and geographical themes. The paper in particular focuses on the use of grids for collecting and representing geographical themes and phenomena and for comparing them over a homogeneous and comparable tessellation of space, if compared to other forms of regionalization.

Joan Carles Membrado tackles the urban expansion and sprawl in Spain in the paper "Costa Blanca: Urban Evolution of a Mediterranean Region through GIS Data". The author highlights in maps the landscape transformation following the real estate 'bubble' in the country and the links with lifestyle migrants that move to Spain from Northern Europe, causing changes in the urban structure and landscape of many locations in the country.

An overview of the Romanian activities in the field of Cartography, Geography and Geographic Information is provided by Florin-Constantin Mihai, who is present with two different papers on "Accessibility of waste collection services in Romania: a multi-scale analysis in EU context using thematic cartography" and on "Spatial distribution of rural dumpsites parameters in Romania". In the first paper a multi-scale approach of the population access to waste management system is analysed, in order to estimate the environmental impact of the new EU regulations on the Romanian situation. The second paper studies the spatial patterns of rural dumpsites in Romania related to the different geographical conditions observable in Romania, by crossing statistical geographical data with on-field observations.

Alessandro Ricci tackles the iconographic representation of the Dutch 'lion' in historical maps, in the paper "Maps, Power and National Identity. The Leo Belgicus as a Symbol of the Independence of the United Provinces". The paper is focused on how the (cartographic) 'lion' helped building the Dutch national identity.

Raffaela Gabriella Rizzo and Luca Simone Rizzo focus on the "Religious heritage in Italy: websites and geolocalization. A new appraisal". Here GIS databases are the backbone of a system aimed at displaying through websites the religious heritage of churches, sites and other religious elements that populate Italian cities and places. A website displaying images, maps, geographical locations and descriptions of such sites is realized and presented.

This special issue therefore represents an opportunity for a certain overview on the state of the Cartographic production and reflections within Geography. Also, without presuming of having covered all of the aspects related to cartography, it is an occasion, once again, for showing the different domains and applications where Cartography can play the role of the main character.

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La Geografia della Sinistra Europea dalla fine della Seconda Guerra Mondiale: omogeneizzazione nazionale o permanenza di comportamenti politici regionali?

The Geography of the European Left from the end of WW II: national homogenization or permanence of the regional political behaviours?

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Riassunto

La geografia delle modalità di voto elettorali europee della Sinistra non possono essere comprese senza considerare le storie politiche nazionali. Gli schemi di distribuzione spaziale dei voti non rappresentano solo riflessi meccanicistici delle attuali strutture regionali. Elementi quali le mediazioni sociali, innervate a livello nazionale e regionale, rappresentano delle determinanti molto forti di questi schemi e spiegano, attraverso complessi meccanismi di persistenza (o isteresi), le relative preferenze, anche quando le strutture di classe e le basi economiche delle regioni, così come le posizioni politiche dei partiti, siano state oggetto di cambiamenti drammatici. Anche se alcune tendenze sembrano andare nella direzione dell'omogeneizzazione delle mappe elettorali a livello nazionale, permangono tuttavia dei contrasti regionali, spesso esplicabili solo attraverso queste determinanti ereditate dal passato.

Parole chiave

Europa, geografia elettorale, Sinistra, processi di lungo termine, omogeneizzazione, isteresi, persistenza

Abstract

The geography of the European electoral patterns (here those of the Left) can surely not be understood without taking into consideration the national political histories. The spatial patterns are not at all mechanistic reflections of the present regional class structures. Social mediations, nationally and regionally embedded, are strong determinants of these spatial patterns and explain, through complex hystereses, their relative permanences, even when the class structures and the economic basis of the regions, as well as the political positions of the parties, have known dramatic changes. Even if some trends appear towards more homogenization of the electoral maps at the national levels, regional contrasts remain, often only explainable by these inherited determinants.

Keywords

Europe, electoral geography, Left, long-term history, homogenization, hysteresis, permanence

The geography of the Left in Europe

Can the geography of the Left be explained, in a global European perspective? (The same question can be asked for the geography of the Right, which has been traditionally the complement and the negative of the one of the Left, although that is no longer exactly true as the new Extreme-Right presents specific regional patterns and an electorate which can partly come from traditional Leftist popular voters, or at least been recruited in former Leftist regions).

Figure 1 presents the electoral pattern of the European Left (Social-Democratic, Extreme-Left and Ecolo-
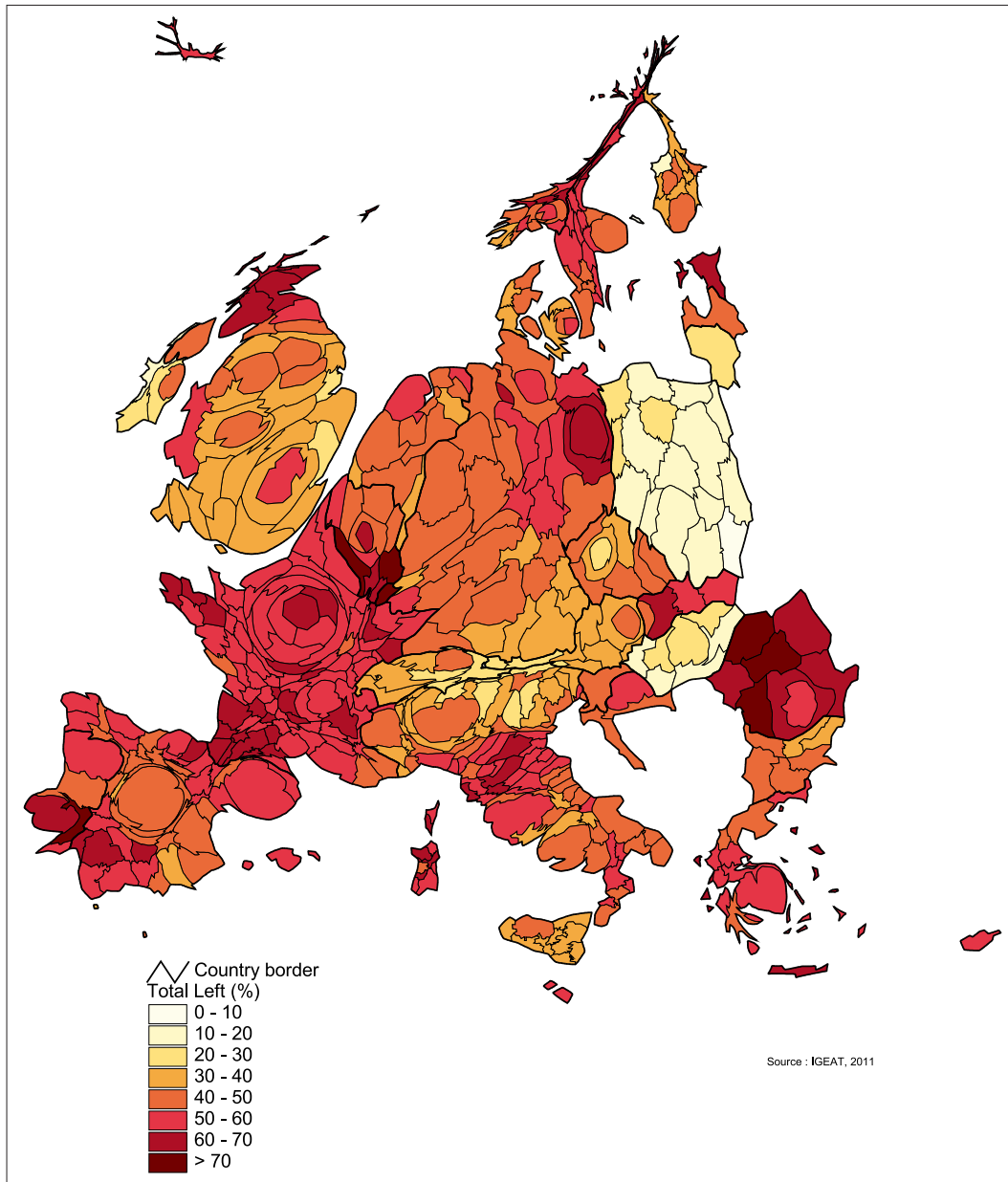
FIGURE 1 – The electoral pattern of the Left (Extreme-Left + Social-Democrats + Greens). 2009 European elections and nearest legislative elections for Iceland, Norway, Switzerland and Croatia.
The areas of the territorial units are proportional to their population.

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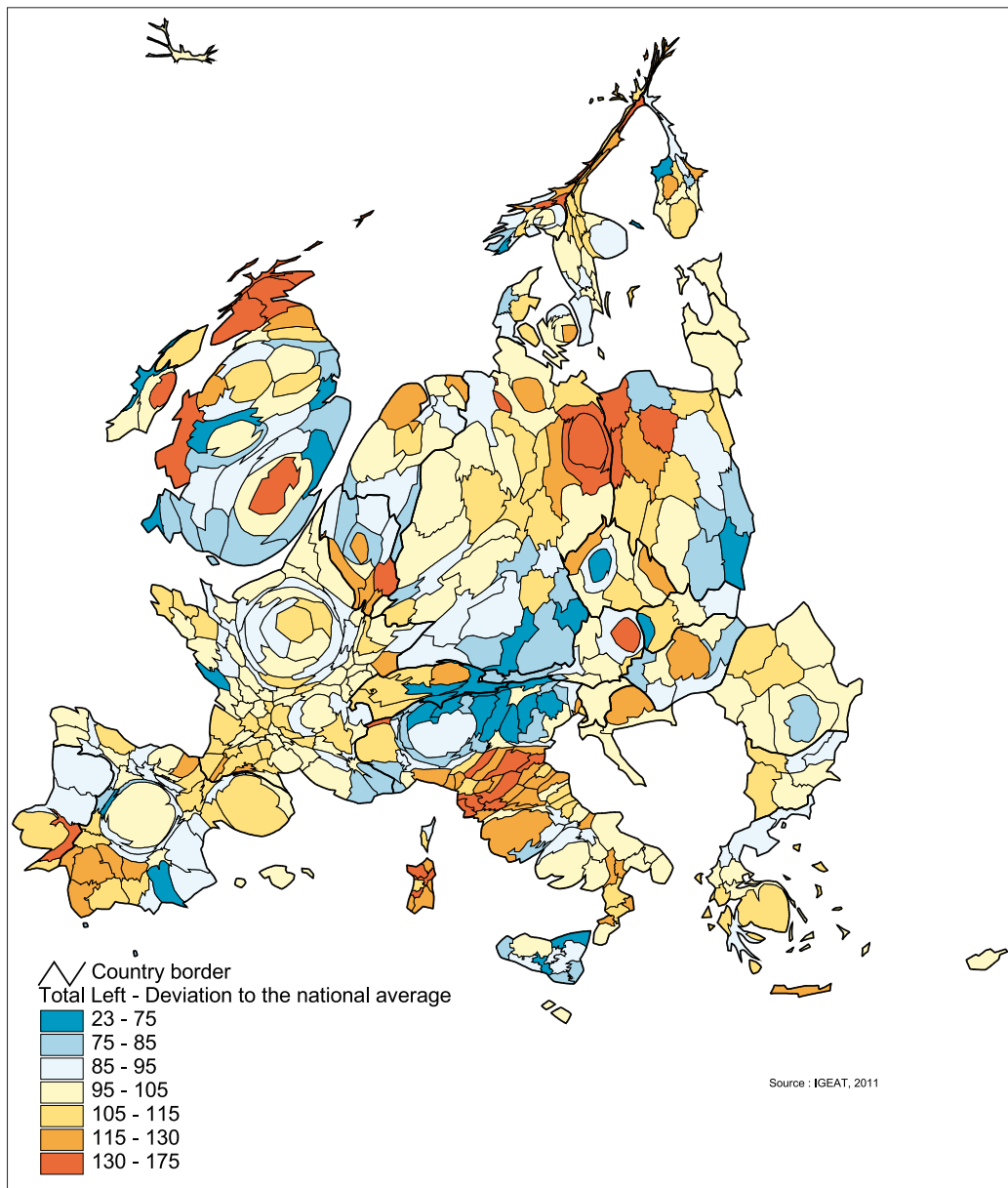
FIGURE 2
The electoral pattern of the Left (Extreme-Left + Social-Democrats + Greens). 2009 European elections and nearest legislative elections for Iceland, Norway, Switzerland and Croatia. Results by comparison to the national averages. The areas of the territorial units are proportional to their population

gists parties[1]) for the 2009 European elections (plus the national elections in Iceland, Norway, Switzerland and Croatia). Considering the European elections presents the advantage of producing an instantaneous overview through a large set of European countries. Also parties belonging to the same political groups at the European Parliament are supposed to have quite similar positions (which is in fact fortunately truer for Leftist parties than for the others).

However, this geographical pattern is difficult to interpret considering:

- that the rates of abstention are very different from one country to another and higher at the European polls than at the national ones;
- that if the elections take place at the same time through the whole European Union, their places within the national political agendas and cycles are

1 The Basque pnv is included in the Left due to its position during the Spanish Civil War, as well as the svp in South Tyrol, belonging now to the Leftist coalition in Italy.

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different. Often the European elections are considered by some electors as an opportunity for sending out a protest vote, without too much consequences;
– that the pattern reflects the specificities of the national political cultures: the Polish working-class and Leftist voters have not the same political backgrounds and attitudes than German, British or Italian ones;
– that, even if less than among the Centre-Right and the Right, the nature of the Social-Democratic parties is differentiated, from labour or former labour parties (like in Britain) to republican Centre-Left parties (in Greece and now in Italy), or from strongly organized Social-Democratic parties (in Germany or in French-speaking Belgium) to parties issued from the former State nomenklatura (like in Romania). In some countries, the Greens have merged with a part of the former Communist or Extreme-Left parties, in other countries they are more exclusively linked to post-modern middle classes. The positioning of the average Leftist electors on a Right – Left scale are quite different from one country to another, as is the positioning of the parties themselves, considering the content of their programs (A.H. Trechsel & P. Mair, 2009; *EVS variable reports*, 2008; C. Vandermotten & al., 2011).

Therefore, we will examine here the regional patterns of the Leftist parties only by comparison to their national average scores (Figure 2). This study is focused on some big Western European countries (Germany, France, Italy, Spain, with some considerations about Belgium), with the perspective of examining if structural permanences can be observed and explained on the long term (at least from the end of World War II). The geographical scale used for this focus is the one of the Regierungsbezirke in Germany[2], the departments in France, the provinces in Spain and Italy. So, it is a regional-structural and not a political-conjunctural analysis: *the weight of the parties in each region at different periods is only characterized by the level of these parties by comparison to their national average score at the same elections*, not taking any account of the national fluctuations of their results. This methodology avoids some of the difficulties listed here above (even if not all).

To close this introduction, let us add that if the Left is sometimes considered here as a whole, its three components often show separate spatial patterns, possibly contrary.

In some countries, the geographical pattern of the Extreme-Left seems to be quite similar to the one of the Social-Democrats, with the Extreme-Left amplifying the results of the Left as a whole in the "red areas". For instance, the correlations are significantly positive between the relative positions of Die Linke and the SPD in Western Germany in 2009 (r = 0,68), of the PCF and the SFIO in France in 1958 (r = 0,49), or between the results of Mélanchon and Hollande at the first round of the presidential elections in this country in 2012 (r = 0,54), or in Spain between IU and the PSOE in 2011 (r = 0,46). It was also historically the case in Belgium where the former small Communist party was the strongest in the strongholds of the dominant Socialist party. But in other cases, Extreme-Left and Social-Democrats are mutually exclusive, with different regional or class historical bases (in Germany as a whole, in 2009, r = -0,27 between Die Linke and the SPD ; in Italy in 1983, r = -0,31 between the PCI and the Socialists).

Considering now the Social-Democrats and the Greens, there is not any significant link in Germany, in France or in Spain, and the geography of the Greens presents even a negative correlation with the one of the Extreme-Left. Even if the self-positioning of the Green's electorate is similar on a Left-Right axis to this one of the Socialist electors, the socio-territorial contents of both political families are different.

Two basic explanatory hypotheses (Table 1)

Let us start from two basic, mechanistic, hypothesis, considering firstly that the individual electoral behaviours should be reflecting the "objective" class position

2 With some subdivisions in the focus to isolate metropolitan areas from the more rural parts of some big Regierungsbezirke, for instance Stuttgart metropolitan area from the rest of North-Wurtemberg, or Munich metropolitan area from the South of High-Bavaria. Rhine-Ruhr and the Cologne metropolitan areas are isolated from the rest of the North-Rhine Westphalian territory. Some Länder which are no more divided in Regierungsbezirke, like Saxony or Saxony-Anhalt, were remained cut up. Berlin is divided between East and West.

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TABLE 1 – Empirical checking of the two basic hypotheses. Correlation (r) between the relative position of the Extreme-Left and the Social-Democrats (hypothesis 1) and of the Greens (hypothesis 2) and independent variables supposed to reflect the class structure and the economic situation of the regions. Results of the 1999 European elections

	Hypothesis 1 : Social-Democrats and Extreme-Left are the political expression of the working-class and the poor and in crisis regions				Hypothesis 2 : the Greens are (at least partly) the political expression of a new well-educated middle class, originating from wealthy spheres and living in prosperous central regions		
	GDP/inhab.	Unemployment rate	Percentage of the secondary sector in the GDP	Percentage of the merchant and financial services in the GDP	GDP/inhab.	Unemployment rate	Percentage of the merchant and financial services in the GDP
Western Europe as a whole	– 0,32	0,27	ns	– 0,26	0,44	– 0,24	0,16
United Kingdom	ns	0,58	ns	ns	0,48	– 0,32	0,59
Netherlands	ns	0,67	ns	– 0,54	ns	ns	ns
Belgium	ns	0,82	ns	ns	ns	0,74	ns
France	– 0,25	ns	ns	ns	0,69	– 0,51	0,57
Germany	– 0,39	0,74	– 0,34	ns	0,80	– 0,55	0,51
Austria	0,92	ns	0,84	0,69	ns	ns	0,86
Switzerland	0,34	...	ns	ns	ns	...	ns
Denmark	...	...	– 0,55	ns	...	...	...
Sweden	– 0,53	0,77	0,40	– 0,54	ns	ns	ns
Norway	ns	...	ns	ns	0,65	...	0,87
Finland	ns	ns	ns	ns	0,90	– 0,71	0,85
Portugal	ns	0,77	– 0,46	ns	0,59	0,48	0,66
Spain	– 0,55	0,63	ns	–0,29	0,61	– 0,43	...
Italy	ns	ns	ns	ns	0,23	– 0,25	0,17
Greece	ns	ns	ns	ns	...	...	...

ns = non significant ; in bold data confirming the hypotheses

of the voters, and secondly that these individual class rationalities should be reflected in the spatial electoral patterns, as a transposition of the class structure and the economic situation of the regions.

The first mechanistic hypothesis: the (traditional) Left is the political expression of the working class

Are Extreme-Left and Social-Democrats together, from a spatial point of view, a political expression of the regions where the working class is strongly present and/or of the poor and declining regions? We don't consider here the Greens, even if it appears from the self-positioning of their electors that they pertain to the Left, because in most cases they don't have any historical and sociological links with the organized worker's movements.

Considering the results of the 1999 European elections, the correlation between the global Extreme-Left and Social-Democrats results and the percentage of manufacturing in the GDP is not significant. At the reverse, the correlation between these positions and the percentage of the market and financial services in the GDP, supposedly being a proxy of the importance of the wealthiest tertiary globalized economy is effectively negative (r = -0,26), but only weakly and not significant at the level of most of the countries considered individually. The correlation with unemployment rates is slightly positive and significant at the whole Western

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European level (r = 0,27), but not within countries like France, Austria, Finland, Italy and Greece. Finally, the correlation with GDP/inhabitant is globally significant and negative considering Western Europe as a whole (r = -0,32), but at the national level it is only significant in France, Germany, Sweden, Spain, while positive correlations even appear in Switzerland and Austria.

So, the first hypothesis is not entirely false, but only weakly confirmed and surely not in the mechanistic sense in which this assertion has been used for decades as a very absolute statement and slogan by the Communist and Socialist parties. This assertion had also been confuted by political scientists long ago (S.M. Lipset & S. Rokkan, 1967; S. Rokkan, 1970; S.W. Rae & M. Taylor, 1970; M. Franklin, 1992; M. Dogan, 1996; G. Evans, 1999; N.D. de Graaf & P. Nieuwbeerta, 1999; T.N. Clark & S.M. Lipset, 2001), even if it remains true that the probability for a worker to vote for a Social-Democratic or Communist party is generally, in each country, higher than among more affluent segments of the electorate. But the attitude of the working class can be deeply influenced by the existence or not of the Christian-Democracy and by many other social mediations. The assertion is also weakened today as the Social-Democratic parties have slipped to the Centre-Left and smoothed radically their discourses, or at least tried to increase their influence among the new tertiary middle-classes, in particular among the non-market services sector.

The second hypothesis: the Greens are the political expression of (at least a part of) a new well-educated, post-Fordist, middle class, living in prosperous central regions and mainly working in the non-market services sector (R. Inglehart, 1993; H. Kriesi, 1998).

At the Western European scale, the positive correlation between the relative position of the Greens and the level of the GDP/inhab. is quite good (r = 0,44), and the correlations are yet stronger at the national scale in most of the largest countries. At the reverse, the correlation between the relative scores of the Greens and unemployment rates is significantly negative at the Western European scale (r = -0,24), and in all the largest countries. Paradoxically, the correlation between the results of the Greens and the percentage of the market and financial services in the GDP is low and unsignificant at the European scale (r = 0,16), but these correlations are very good in each country (Germany : 0,51 ; France : 0,57 ; United Kingdom : 0,59), if not in Italy and in Spain, but the Greens are very weak in both latter countries.

In conclusion, the two hypotheses are only very incompletely confirmed. They are surely not sufficient to explain the electoral patterns of the European Left. The hypothesis concerning the Greens is however better proved than the first one. The individual political behaviours are not traced mechanically on the self-proclaimed positions of the parties, as defenders of one or another social group, and moreover the spatial electoral patterns are reproducing long-term socio-political mediations nationally and locally embedded.

A complex set of explanations

Understanding of electoral patterns implies taking into account various long-term explanatory factors, linked to the peculiarities of the social and political histories of the different countries.

So, the explanations for the electoral pattern of the Left are manifold, and differ from one national situation to another (S.M. Lipset & S. Rokkan, 1967; M. Dogan, 1996). Let us examine different factors determining the strength of the Left.

The impact of an early industrialisation (mainly heavy metallurgy and mining)

This factor connects to a certain extent to the mechanistic hypothesis evoked above: the Leftist vote as a political expression of the working class. But it is truer for the metallurgical and coal-mining regions (and for the harbours) than for the textile regions. Considering the European electoral results in 1999 and 2004, but structural data for 1980, that is before the definitive collapse of coal-mining and large parts of the steel industry in many early industrial regions, the percentage for the Left in the Western European regions where basic metallurgy counted for less than 2 % of the GDP was 40,8 % (index 98) and in those where this percent-

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age was higher 44,8 % (108). In the early industrialised coal-mining or metallurgical regions, it was 47,6 % (118), against 41,7 % (98) in the other regions.

The impact of Catholicism

In Catholic regions, the impact of industrialisation cannot be analysed outside considerations on the time of its beginning. Regions were industrialisation (and the working class organizations going with it) was strongly implanted before the promulgation of the encyclical *De Rerum Novarum* (1891) are more Leftist than regions industrialised later on. In this case, the Catholic Church disposed already of the tools for framing the working class through Christian worker's movements and possibly later on through Christian-Democratic trade unions and parties (P. Marissal, P. Medina Lockhart, C. Vandermotten & G. Van Hamme, 2007).

This influence persists even if the attendance to the mess is now low everywhere through Europe. Considering the results of the Left at the European elections in 1999 in the Catholic regions of Western Europe and the level of practice at the beginning of the Eighties, the correlation is negative and much stronger than the (positive) one observed with the importance of the working class (or with any other explanatory factor) (Table 2). For Catholic Western Europe as a whole it is -0,54 (- 0,21 in France; - 0,40 in Spain; -0,59 in Italy ; -0,60 in the Catholic parts of Germany; -0,60 in Portugal; -0,63 in Belgium; -0,82 in Austria).

TABLE 2 – Correlation (r) between the relative level of the Left and the religious practice in Catholic areas

Catholic Western Europe as a whole	- 0,54
Belgium	- 0,63
France	- 0,21
Germany	- 0,60
Austria	- 0,82
Portugal	- 0,60
Spain	- 0,40
Italy	- 0,59

all the coefficient are significant

This influence of the Church on the electoral behaviours is not present in Protestant (and Anglican) countries, where the development of the political weight of the bourgeoisie and after that of the socialist movement during the XIX Century was not on a par with the development of anticlericalism.

The German case illustrates very well the impact of Catholicism on the level of the Left (Table 3). It is worth underlining that this differential impact remains, even if religious practices were strongly declining between 1949 and 2009.

TABLE 3 – Relative level of the Left in Western Germany and standard deviations between brackets (Western Germany without Saarland and Berlin = 100)

	1949	2009
Protestant regions (13 regions)	106,3 (20,6)	109,8 (16,7)
Idem, including Eastern Germany (26 regions)	...	*125,7 (25,2)*
Mixed regions (7 regions)	100,0 (16,0)	102,8 (15,9)
Catholic regions (13 regions)	71,5 (14,8)	84,5 (23,1)

The metropolitan Left

If the traditional "red belts" around or "red districts" inside some big capital cities have faded, as a consequence of the collapse of metropolitan manufacturing, these main metropolitan areas remain generally more Leftist than the national averages (and than their affluent suburban areas), but on renewed bases. This renewal of the metropolitan Left has two very different and not-linked social bases: on the one side, "poor" people from the recent immigration, a popular basis but very different from the former local working class; on the other, gentrifiers and well-educated (young) people working mainly in the (non-market) tertiary sector. This last category is in particular voting for the Greens, at least in the countries where this political family is well implanted. This also means a very difficult programmatic exercise for the Socialist parties if they want to keep both segments of their electorate. The only exceptions to this

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over-representation of the Left in the main metropolitan areas are Milan (but not if taking Northern Italy as the average), Madrid (but not if taking Central Spain as the average) and Stockholm.

However, this rule is not true in Central-Eastern Europe: here, at the reverse, metropolitan areas are in general more Rightist than the national averages: in these countries, the capital cities gather the "winners" of the economic transition, as they are the nodes of the participation of these economies in the networks organized from Western Europe and the best-equipped places for high-level services. But the Rightist character of the capital cities in Central-Eastern Europe is related to the weight of a neo-liberal, cosmopolitan Right, and less to a traditional rural or populist Right (or Extreme-Right), as it is in the remote, often Eastern, regions of these countries (South-Eastern Poland, Eastern Slovakia, rural Hungary). That is perhaps why Budapest is an exception, being more at the Left than the rest of Hungary: on the one hand the Hungarian Socialist party has very neo-liberal positions and gathers people from the former nomenklatura who were, even before 1989, very open to the development of a free market; on the other hand, the dominant Hungarian Right (and obviously still much more the Extreme-Right) defends very conservative, traditional and populist positions, which does not fit well with the aims of a new neo-liberal open-minded bourgeoisie.

The heritage of the former agrarian structures

It is interesting to consider the impact of this factor, even in regions where in the meantime the percentage of farmers in the active population is now very low.

Share-cropping was an agrarian regime implying distrust between the owners of the land and the share-croppers. Even if this regime disappeared long ago, traditional share-cropping regions in Western Europe remain significantly more Leftist regions. Using the average of the 1999 and 2004 European elections relative scores, it appears that the results of the Left in the traditionally share-cropping regions are 121 % of the national average scores (122 % in Italy, 112 % in France).

In the traditional latifundia regions, things are not so clear and the scores of the Left seem to depend on the history of the class relations with the big landlords (and the Church, if it was strongly allied to the big owners and possibly was big owner itself). So, if in Spain the results of the Left are well higher in the Southern latifundia regions than the national average (106 %), and so yet more clearly in Portugal, the reverse occurs in Italy (92 %). In Southern Italy, the growing dependence on the State has allowed the Southerner Christian-Democracy to play an important role through formal and informal networks.

The traditional dominance of tenant farming does not imply specific political attitudes, if not Centrists.

Finally, traditional small property regions are often less favourable to the Left (Italy : 83 % ; Spain : 91 % ; it is the case also in Belgium and in Germany, but it is not significant in France). The Rightist character of this kind of regions can be linked to the fact that the Catholic clergy was not seen there as being in landowners' service, but at the opposite was close to local communities, framing, supervising and educating them (A. Siegfried, 1913; P. Marissal, P. Medina Lockhart, C. Vandermotten & G. Van Hamme, 2007).

The core-periphery cleavage

Peripheral or declining regions can be Leftist regions, but mainly when these peripheral regions have got simultaneously a strong cultural or historical identity, opposed to the national cores, considered as "colonizing", and when they were political but not economic peripheries, even if they possibly now become shrinking early industrial regions. It is the case for Scotland, Wales, Catalonia, Basque county, Wallonia, and more recently Eastern Germany.

At the reverse, remote regions are generally more oriented towards a traditional Right, either when they are not characterized by a linguistic-cultural strong identity, or more if these political attitudes are reinforced by a dominance of the small farming ownership. It is for instance the case in the Alpine regions.

The impact of former familial structures

This a another good example of hystereses, even if this impact has to be considered with caution. E. Todd

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(1990) emphasizes the impact of the former familial structures on the social and political attitudes. He argues that the European familial structures can be characterized either by egalitarian or inegalitarian rules, in particular concerning legacy, and either by nuclear or more enlarged, community, structures. His argument is that community structures favour the Left and the Extreme-Left (like in Southern Portugal, Southern Spain or Central Italy), that inegalitarian structures (with the right of primogeniture, meaning a social acceptance of inequality and the duty for the younger childrens to find a job on a self-made basis) favour the Right (like in England), and that egalitarian nuclear structures determine in-between Centrist political attitudes, like in the Parisian basin. The evidence seems surely confirming this hypothesis (Table 4), but the problem is that the geography of the familial structures proposed by Todd is built on quite weak empirical materials, ... including sometimes the political patterns.

TABLE 4 – Relative level of the Left
(by comparison to the national averages = 100)
in the regions of the familial typology, as defined by E. Todd

Type of region	Extreme-Left	Social-Democrats
Inegalitarian nuclear families	76	90
Egalitarian nuclear families	98	96
Patriarchal-authoritarian families	68	108
Community families	131	127
Community with matrilinear forms	141	120
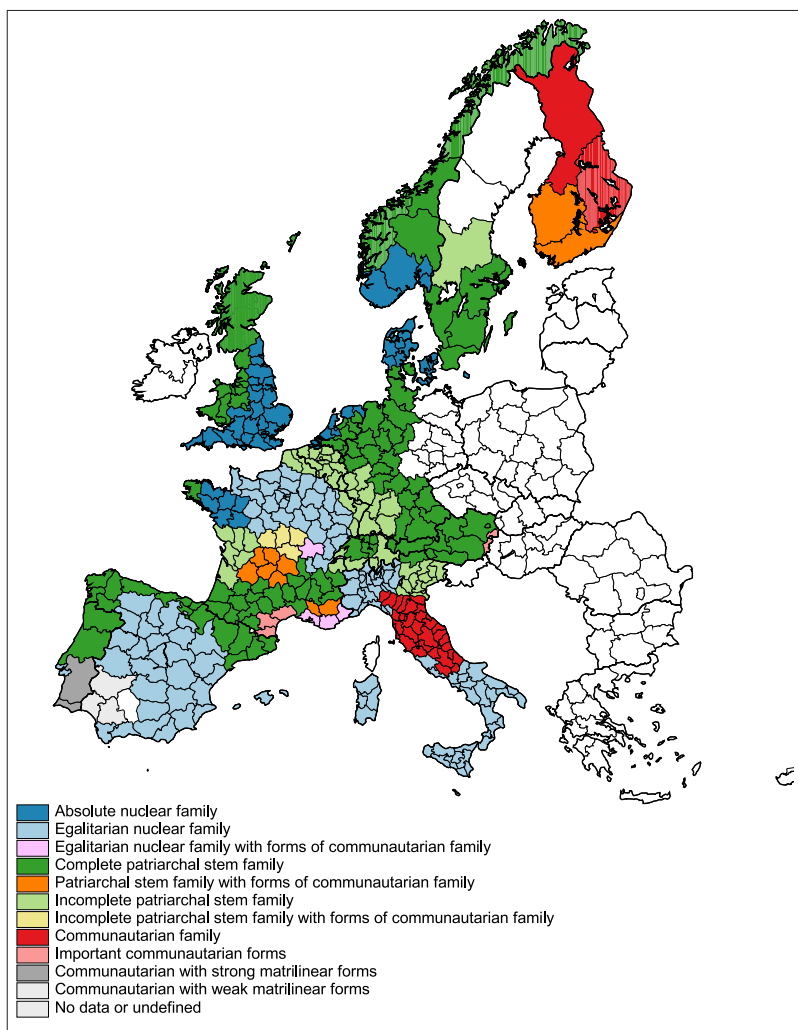
FIGURE 3
Map of the familial structures
in Western Europe, according to E. Todd (1990)

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Permanence and transmission factors

It appears clearly from the previous considerations that many explanations depends on hystereses. An hysteresis is a present situation or mechanism reflecting past causes: it provides long-term historical, materialist reasons for phenomena too often only referred to "social attitudes" or "mentalities", not otherwise explained. The hystereses are the product of processes of self-reproduction of the socio-political phenomena, conveyed through the bias of the family, the vicinity, the education, the social organizations (trade unions, welfare structures), the local political authorities, etc.

The Belgian case offers a good illustration of the weight of such social structures inherited from the early industrialisation period, in the framework of a bilingual country (thus with different media and socialisation processes) and an industrialization taking place before *De Rerum Novarum* in the French-speaking South, mainly after in the Dutch-speaking North. So, now in Belgium, the Socialist vote is not correlated to the present geography of metallurgic manufacturing, but the present geography of the Socialist pillar (Socialist trade unions, mutual insurances, etc.) is well correlated to the geography of metallurgy and coal-mining in 1910 and the present Socialist geography is correlated to the geography of the present Socialist pillar (Figure 4; Q. David & G. Van Hamme, 2011).

Considering only the results of the elections from the end of World War II in some big European countries, it appears that the permanences are higher where Leftist parties and their associated pillars are more structured and embedded in local territories. The organisation of the parties and their pillars is the strongest in French-speaking Belgium and Germany, then in Italy (due to the former PCI), then in Spain and finally the weakest in France (taking also into account the collapse of the PCF), where from the very beginning the Socialist parties relies more on the petty bourgeoisie than on the blue-collars (F. Sawicki, 1997). That is exactly the order in which these countries can be ranked concerning the correlation between the geographies of the Left through different time intervals (Table 5).

The negative coefficient in Flanders renders an account of the historical weakness of the Socialist framing structures in this part of Belgium, where they were strongly competed by the Christian-Democratic ones, and in consequence the incapability of the Socialist party to keep its local influence when this traditional blue-collars basis was weakened. At the reverse in Wallonia, the Socialist framing structures were and often remain hegemonic.

Breaks in the geographical patterns of the Left can also be related to the emergence of a populist Extreme-Right competition, for instance in France where the FN reaches good scores in former industrial belts or in red
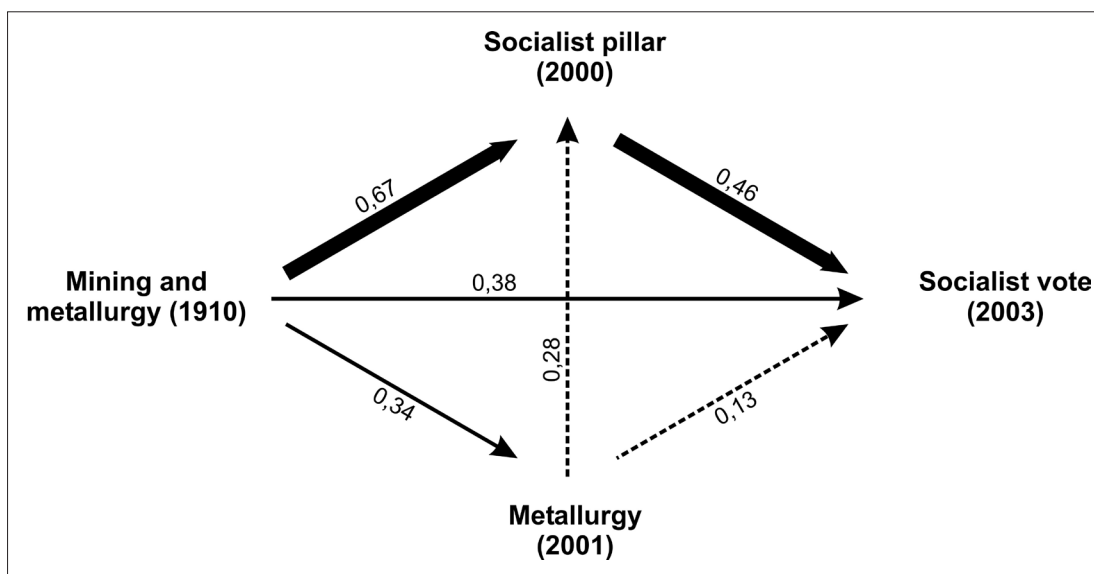
FIGURE 4
The Belgian case : the weight of the framing structures inherited from the early industrialisation

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TABLE 5 – Some correlations (r) between the relative spatial patterns of the Left through different time intervals

		1921-1999		1981-1999
Belgium	Socialists	0,58		0,85
Wallonia	Socialists	0,66		0,94
Flanders	Socialists	– 0,25		0,78
			1949-2009	1983-2009
Western Germany	Social-Democrats		0,76	0,92
			1948-2013	1983-2013
Italy	PCI/PD		0,78	0,86
		1936-2011		1982-2011
Spain	Total Left	0,39		0,73
			1951-2012	1981-2012
France	Total Left		0,37	0,52
	Socialists		0,41	0,60
	Communists/Mélanchon		0,47	0,34

suburbs of large cities. Although we can not conclude that the former Communist voters choose now to support the Extreme-Right, that means that the latter finds fertile grounds in these areas (S. Etchebarre, 1989). But even such a dramatic break like the Spanish Civil War and the Franquist period in Spain does not exclude some similarities between the present and the pre-civil war electoral patterns in this country, with the exception of the "Rightisation" of the Mediterranean coast (as it is the case in France too) (Figure 5).
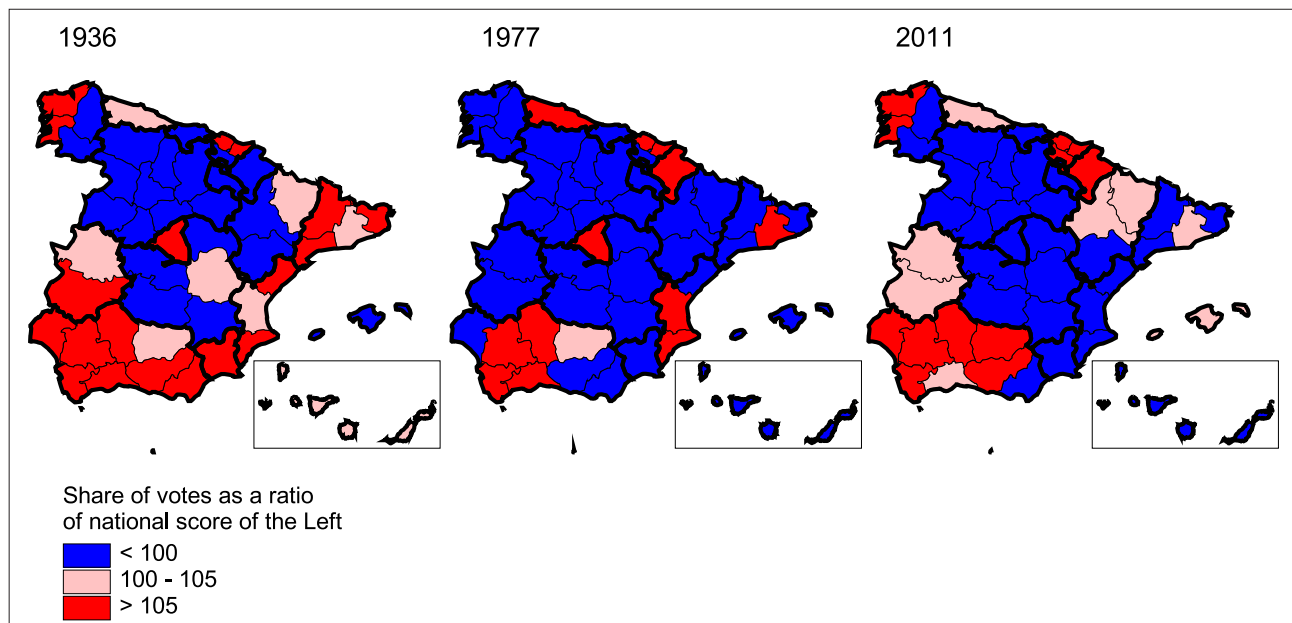
FIGURE 5 – Relative levels of the Left in Spain. 1936, 1977 and 2011

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A weakening of the regional political cultures, on behalf of an homogenization of the political attitudes at the national scales from the end of WW II?

Many political scientists argue that the development of the national media, the TV, the homogenization of the ways of life and the weakening of the ideologies lead to an homogenization of the political attitudes at the national levels (D. Caramani, 1994; see also J.A. Agnew, 1987, for a discussion). Is that confirmed looking at the evolution of the standard deviations of the Left in some European countries from the end of World War II ?

Actually, some weakening of the standard variations can be observed, mainly where they were initially the strongest (Table 6, Figure 6).

Going more in depth, a global trend towards a relative reinforcement of the Left can be observed where it was the weakest, with the exception of Germany (for instance in North-Western Spain, Western France, North-Eastern France) (Table 7, Figure 7). These trends in favour of the Left are often observed in former rural, traditional, Catholic, small properties regions, but having experienced a Fordist industrialisation from the Sixties onwards (North-Western Spain, Western France, Belgian Limburg, Southern Italy).

At the reverse, some weakenings of the Left are observed in Leftist regions, for instance in traditionally rural early secularized regions (Limousin, French Mediterranean hinterland), in tourist seasides (French and Spanish Mediterranean coasts), in some early industrial regions, when the weakening of the traditional political frames allowed the emergence of a populist Extreme-Right (Nord-Pas-de-Calais, fringes of Emilia-Romagna), and in some metropolitan areas, but here at the reverse of the general trend in this kind of areas (Francfort, Madrid, Milan).

In-between, many regions keep a stable relative positioning. For the Left, it is the case in early industrial regions with solid political frames (Wallonia, Rhine-Ruhr, Basque county), in traditional Leftist strongholds, rural or not (Andalusia, heart of the Emilia-Romagna, Tuscany, Umbria). The Right keeps its relative positions in some of its own traditional strongholds, rural or not (Southern Germany, North-Eastern Italy).

Germany and Belgium are two exceptions in this process towards more homogenization.

In Western Germany, the North-South divide is growing (Protestant regions + Ruhr – Catholic in majority, but early and heavily industrialized, *vs.* other Catholic regions), despite of a strong weakening of the religious practice (Figure 8). But homogenization trends can be observed at the scale of each Land. Not to speak about the remaining strong political divide between Western and Eastern Germany after two decades of reunification.

In Belgium, not any homogenization at all can be observed between Flanders and Wallonia (and Brussels): the two parts of Belgium have no more got any national parties or public opinion, and act in fact as two different countries.

In conclusion, beyond an important geographical stability, a trend towards national homogenization of the voting behaviour can be observed, stronger where the local political framing structures are the weakest. That could be linked to the development of the national media, but also to a trend towards the homogenization of the social structures through the countries: exclusively agricultural regions have disappeared, manufacturing developed in former rural areas, services developed everywhere and secularization of the society progressed everywhere too. Moreover the expression of the national homogenization is not only characterized by the fading of Rightist or Leftist geographical strongholds, but also in the sliding of the programs of the prominent Leftist parties towards more Centrist positions (G. Moschonas, 1994; H. Kitschelt, 1994; G. Van Hamme, 2012).

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TABLE 6 – Standard variation of the relative regional positions of the Left (at the level of the departments, provinces, Regierungsbezirke, sometimes subdivided) (legislative polls, except for France, presidential elections for 1981, 2002 and 2012)

		1948-1951		1981-1983		2000-2002		2009-2013	
		Standard variation	National score	Standard variation	National score	Standard variation	National score	Standard variation	National score
France	Total Left	30,2	43 %	11,0	52 %	11,9	35 %	12,2	51 %
	Communists	33,8	27 %	31,7	16 %	39,6	3 %	17,4	11 % (a)
Italy	Total Left	37,6	38 %	20,4	47 %			22,6	29 %
	PCI/PD	44,1	31 %	35,4	30 %			24,9	25 %
Spain	Total Left			22,0	59 %	22,7	47 %	25,7	43 %
	Communists			52,7	4 %	45,6	6 %	33,8	7 %
	Socialists			20,9	48 %	22,7	35 %	18,5	29 %
Western Germany	Total Left	23,6	35 %	8,0	44 %	19,6	49 %	16,0	44 %
	Social-Democrats	23,6	29 %	19,5	38 %	21,8	38 %	22,3	24 %

(a) With Mélanchon's Left party
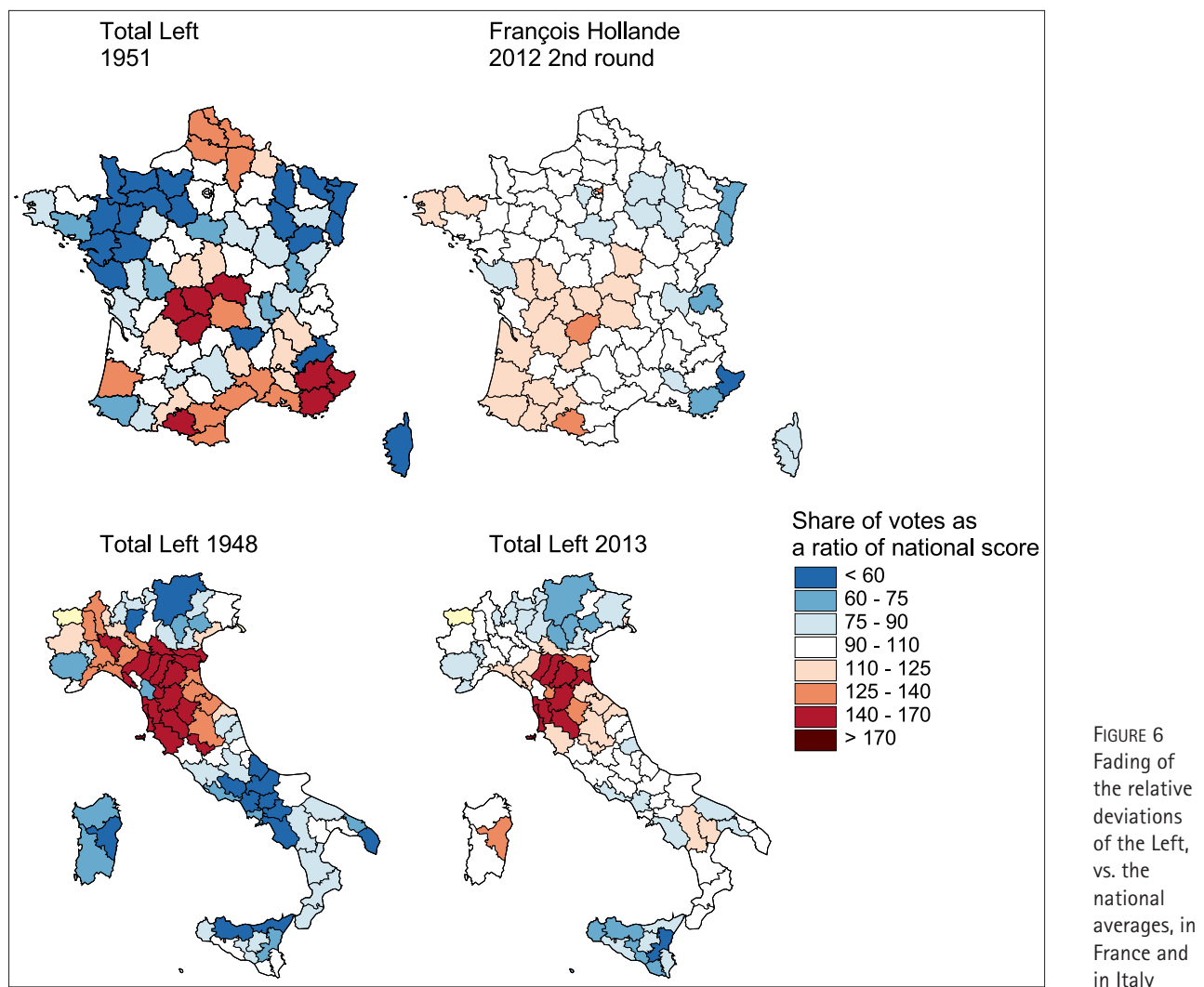
FIGURE 6 Fading of the relative deviations of the Left, vs. the national averages, in France and in Italy

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TABLE 7 – Level and evolution of the relative position of the Left in Western Germany, France, Italy and Spain (average percentage of the number of territorial units, in each country)

		Relative electoral position of the Left in 2009-2013 (100 = national averages)			
		Weak (< 90)	Around the average (90 -110)	Strong (> 110)	Total
Relative trend of the Left (1949-51 – 2009-13) (a)	Growing	17 %	11 %	2 %	30 %
	Without significant trend	20 %	18 %	14 %	52 %
	Declining	4 %	7 %	9 %	20 %
	Total	41 %	36 %	25 %	100 %

(a) 1977-2011 in Spain
The four boxes of the table showing some statistical significance, using a khi squared test, are at the four corners of the squared table : the Left is more often growing strongly in regions where it is weak and it is more often declining in regions where it is strong, and *vice-versa*.
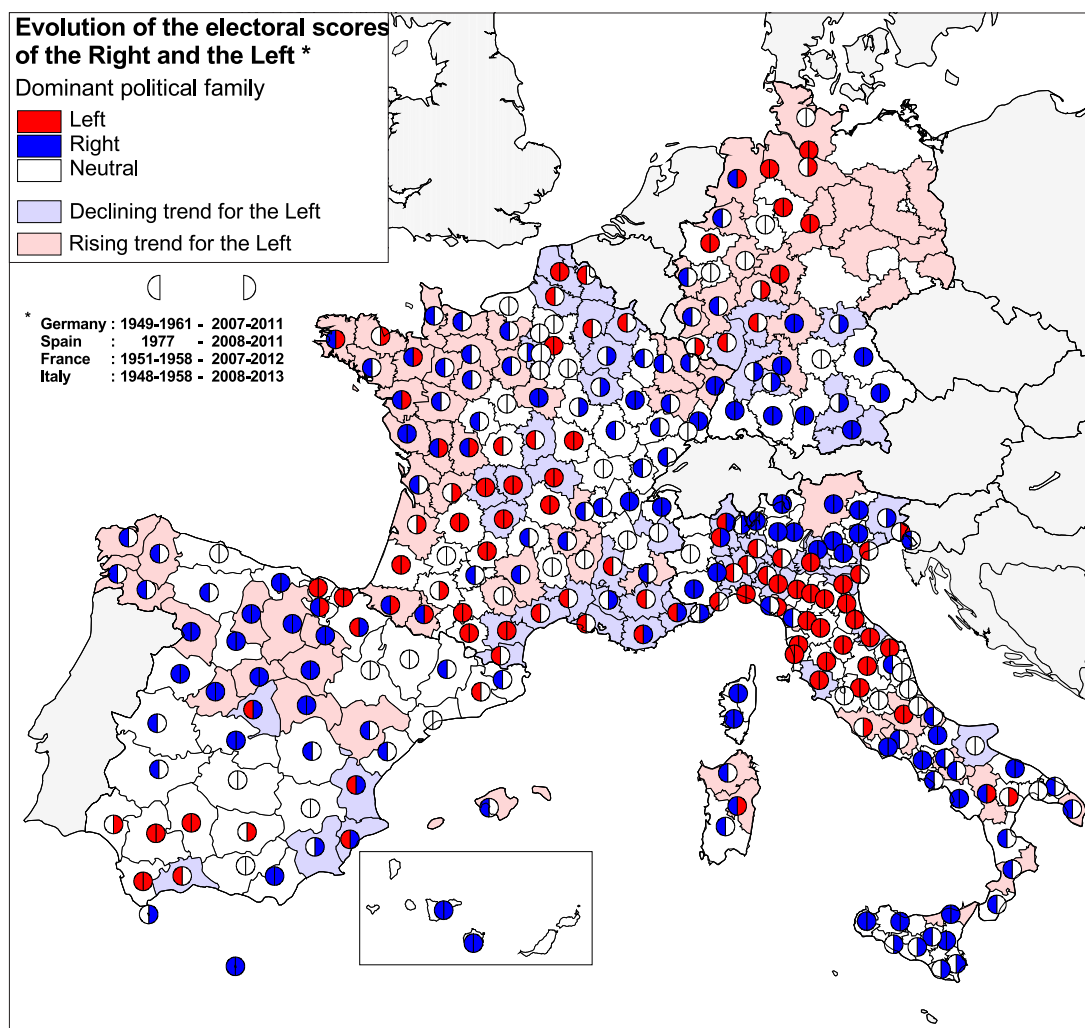
FIGURE 7 Comparative evolution of the relative results of the Left and the Right

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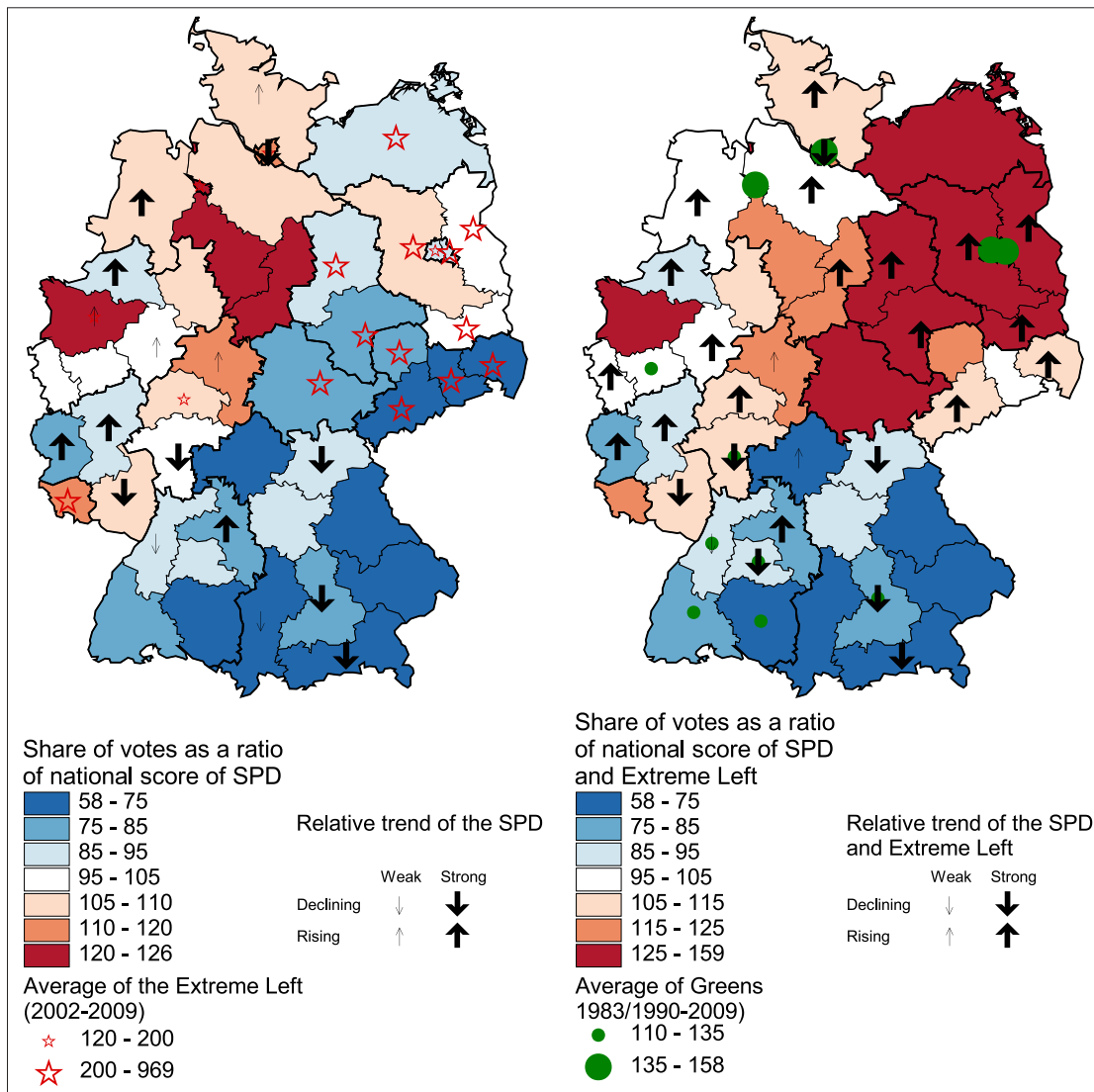
FIGURE 8 Evolution of the electoral patterns in Germany

General conclusions

The main conclusions of this paper are:

- that, even using data from European polls, the electoral spatial patterns have to be explained within the national frameworks, taking into account the legacies of the national socio-political histories and hystereses;
- that the understanding of the electoral patterns can surely not be reduced to dogmatic or mechanistic class-based explanations. But that does not mean that class structures do not matter: only they act through the historically built-up superstructures and the influence of complex ideological mediations, each with their own temporality;
- that, notwithstanding a trend towards more spatial homogenization at the national level and the fading of some traditional partisan strongholds, the electoral patterns remain relatively stable through time, reflecting at new the weight of the hystereses.

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L'image cartographique de l'espace tunisien vu de l'Occident à l'époque moderne: approches historiographique et quantitative (du XVI[e] au XVIII[e] siècle)

The cartographic image of the Tunisian space seen from 'the West' in the modern age: historiographic and quantitative approaches (from XVI to XVIII century)

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Résumé

Cette étude aborde la conception de l'espace tunisien depuis l'Occident, à travers la représentation cartographique à l'époque moderne du XVIe siècle au XVIIIe siècle, d'après des sources issues principalement des collections de la Bibliothèque nationale de France. Cette étude a pour ambition de proposer un travail d'investigation de l'image cartographique de l'espace tunisien en privilégiant deux approches : une approche historiographique et une approche quantitative. L'objectif principal de la présente étude est de détecter les grandes phases historiques dans la représentation de l'espace tunisien, à partir d'un corpus assez dense. Nous proposons d'individualiser trois images cartographiques qui correspondent à des étapes importantes de l'évolution cartographique moderne ou encore à de grandes ruptures dans sa construction. Ces étapes correspondent à chaque fois à de nouveaux récits de voyages et par la suite à une évolution du regard. Les "cartes-modèles" que nous identifions dans un premier temps, sont ensuite l'objet d'une expérimentation dans une approche quantitative sous MapAnalyst qui est une application logicielle pour l'analyse de la précision géométrique des cartes historiques. Il s'agit d'une nouvelle approche pour le couplage éventuel de l'histoire avec les procédés de la cartographie d'aujourd'hui. Cette approche portant sur les déformations des surfaces, vise à une comparaison entre deux surfaces : une surface-source supposée "exacte" et une surface-image correspondant aux exemples historiques analysés. L'approche quantitative sous MapAnalyst permet non seulement de présenter les résultats graphiques et statistiques relatifs à l'exactitude des "cartes-modèles", mais aussi de faire apparaître les structures cachées ou invisibles de déformation.

Les mots clés

Cartes-modèles, Cours d'eau, Déformations, Epoque moderne (XVI[e]-XVIII[e] siècles), Espace tunisien, Grille de distorsion, Toponymie, Transformation géométrique, Vecteur de déplacement

Abstract

This paper addresses the perception of the Tunisian space from a Western point of view, by means of the cartographic representation in the modern age, from the XVI to the XVIII century, found in the collections of the French National Library. This research proposes an investigation of the cartographic image of the Tunisian space with two main approaches, a storiographic and a quantitative ones. The main objective of this study is finding the big historical phases of representation of the Tunisian space.

We propose to identify three cartographic images that represent important milestones in the evolution of modern cartography. Such milestones and cartographic models are part of an experiment we carried on by a quantitative approach using MapAnalyst, a software used for the analysis of the geometric precision of historical maps. Such an approach was thought for coupling the traditional historical cartographic analysis with the modern, digital one. As a result, we obtain two surfaces concerning the distortions of the maps: an 'exact' surface and an 'image' surface that correspond to the historical analysis. The quantitative approach via MapAnalyst allows not only presenting the graphic and statistical results related to the correctness of the 'map models', but also to make the deformations be evident.

Keywords

Map models, Deformations, Modern Age (XVI-XVIII century), Tunisian Space, Distortion Grid, Toponymics, Geometric Transformation, Vector of Displacement

Introduction

La cartographie a précédé l'écriture. Elle est née du double désir de l'homme de représenter graphiquement les lieux qu'il fréquente, la terre dans sa totalité et de mesurer les itinéraires. Elle se perfectionne et se diversifie à mesure que l'homme découvre la terre et à mesure que se développent les possibilités scientifiques et techniques ainsi que les besoins économiques, politiques et militaires. La cartographie comme science a une histoire. Présenter une image cartographique d'un espace bien déterminé dans un contexte historique précis implique une étude des " liens de la carte au temps " (Jacob C., 1992). En fait, la carte fait partie des éléments d'une civilisation et se trouve liée à ses aspects matériels et culturels.

Nous souhaitons aborder la représentation cartographique occidentale de la "Tunisie" et ses environs géographiques à l'époque moderne, du XVIe siècle au XVIIIe siècle d'après des sources issues principalement des collections de la Bibliothèque nationale de France. La Tunisie est un pays d'Afrique du nord, bordée au nord et à l'est par la mer Méditerranée, à l'ouest par l'Algérie, au sud-est par la Libye .

Certes, il parait difficile de cerner la production cartographique de la "Tunisie" à l'époque moderne puis qu'elle est un état contemporain. Mais, il est possible d'appréhender l'image cartographique moderne de ce pays à travers un aspect particulier, comme celui de l'espace. L'espace a des contours moins clairs et il n'est pas défini en référence à ceux qui l'occupent ou en faisant appel à la question du pouvoir. Nous utilisons l'expression *espace tunisien* dans le sens d'unité territoriale choisie pour appréhender l'évolution de son image cartographique et les différents regards successifs portés durant la période moderne. Le travail d'investigation privilégie deux approches : une approche historiographique et une approche quantitative.

1. Approche historiographique de l'image cartographique de l'espace tunisien moderne vu de l'Occident

1.1. L'Hypothèse des grandes phases historiques

Notre hypothèse admet que l'évolution de l'image cartographique correspond à trois grandes phases historiques ou encore à trois grandes ruptures dans sa construction, marquées à chaque fois par un déplacement du centre d'intérêt et partant de " gravité " de la carte produite. Ces étapes correspondent à chaque fois à l'exploitation de nouveaux récits de voyages et par la suite à une évolution du regard géographique occidental.

L'hypothèse des grandes phases cartographiques de l'espace tunisien moderne montre le fantastique développement qu'a connu la science cartographique durant cette période, mais elle met également en valeur la persistance pluri -décennale de certaines formes. Ces cartes modernes qu'on désigne comme " cartes-modèles " ne sont pas représentatives en terme d'effectifs ou de la production cartographique de la période moderne. Ce sont les cartes des auteurs phares de l'époque moderne.

Ces auteurs s'inspirent plus de l'état des connaissances de l'époque que d'autres qui se contentent de " plagier " des œuvres dont le contenu est anachronique (Badariotti D., 1987). Les cartographes ayant introduit des changements enrichissants et essayant de mettre à jour des connaissances héritées avec les données de première main sont peu nombreux. La plupart choisissent de copier d'une façon plus ou moins réussie des modèles antérieurs. Il s'agit d'une pratique courante à l'époque moderne qui consiste à publier de vieilles cartes en les rajeunissant par une nouvelle date. Cette pratique peut engendrer la réapparition de cartes désuètes après plusieurs années.

L'hypothèse de grandes phases ne peut être formulée de façon gratuite: elle est fondée sur des critères fondamentaux. L'étude de chaque phase donne l'occasion d'étudier le mode d'élaboration du savoir géographique et les modalités de son évolution. Chaque phase représente une " grille d'interprétation " de l'espace tunisien par le biais de ces critères liés au fond et à la forme de l'image cartographique de l'espace tunisien.

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Nous donnons la priorité au fond cartographique qui représente la base essentielle de la cartographie et la structure de l'espace tunisien. Le fond privilégie les éléments linéaires. En premier lieu, les lignes hydrographiques des principaux cours d'eau représentent, dans ce cas d'espèce, un élément fondamental. Les cours d'eau ont donné leurs noms et leurs caractéristiques à l'ensemble territorial environnant.

L'étude des éléments linéaires privilégie encore l'esquisse de la côte. Si nous portons un intérêt particulier à la ligne côtière de l'espace tunisien, c'est parce que son importance est primordiale dans l'organisation de l'espace tunisien. Les apparences variées du tracé cartographique de la côte de l'espace tunisien dans les phases historiques constituent d'ailleurs un indice épistémologique intéressant. Soumettre aussi les tracés du littoral tunisien dans quelques cartes modernes de l'espace tunisien à une stratégie de déconstruction consiste à mettre en valeur leurs écarts par rapport à la " réalité".

Le contenu privilégie aussi l'onomastique. Ce substrat toponymique moderne est passé d'un substrat toponymique ancien à un substrat toponymique moderne. En outre, l'image morphologique de l'espace tunisien se construit progressivement. Ayant vécu d'importants changements politiques, il est à la croisée des deux notions territoriales : "*Africa*" en état de déclin et "*royaume de Tunis*" en état d'essor.

Au-delà de tous ces éléments qui structurent l'espace tunisien, la cartographie évolue également en raison des techniques mises en œuvre. Nous abordons sur ce point un problème délicat relatif au statut épistémologique de la géographie de l'espace tunisien à l'époque moderne : les caractéristiques de l'ensemble de la littérature géohistorique de l'époque moderne en ce qui concerne le style, la méthodologie de la description ou encore la façon dont on écrit la géographie de l'espace tunisien.

1.2. Les cartes-modèles

Dans une première phase, et au début du XVIe siècle, l'image cartographique de l'espace tunisien est encore tributaire de l'héritage antique et particulièrement Ptoléméen. En effet, la redécouverte de la *Géographie* de Ptolémée ouvre une ère nouvelle (Gauthier-Dalché P., 2009). A la suite de la traduction en latin de l'ouvrage en 1409, les éditions se multiplient, sous forme manuscrite puis imprimée, après 1475. L'édition vénitienne de Bernardo Sylvano en 1511 s'inscrit dans cette tradition ptoléméenne (Gauthier-Dalché P., 2009). L'ouvrage de Sylvano s'intitule *Claudii Ptholemaei, Liber geographiae, cum sunt diligenti cura emendatus et impressus* (BnF, Département des cartes et plans, GE DD-1008 (RES)). Dans son ouvrage l'espace tunisien est concerné par la "Secunda Africae Tabula". La carte de l'espace tunisien occidental est insérée dans des œuvres ayant un sujet vaste : cosmographies ou histoires universelles, atlas ou descriptions du monde. Ces ouvrages consacrent une partie minime de leur texte à l'espace tunisien.

La seconde phase marque le passage à un autre mode de production des cartes, celui de la cartographie de cabinet qui correspond à une géographie descriptive et encyclopédique. La carte de l'italien Livio Sanuto, intitulée " Africae Tabula V : Constantina, Tunetensis, Tripolitana" (BnF, Département des cartes et plans, GE DD-2987 (7976)) figure dans sa *Geografia* (BnF, Département des cartes et plans-magasin de la Réserve RES GE DD- 2011), représente une seconde phase dans la représentation de l'espace tunisien. Cette phase repose sur une double influence : la traduction de nombreux ouvrages de la bibliothèque antique, et la publication de *La description de l'Afrique* de Léon l'Africain (Hassan al-Wazzan, né à Grenade vers 1490, mort à Tunis après 1550) dans les principales langues européennes. Sanuto s'est effectivement inspiré de Léon l'Africain : le premier est surtout un géographe, le second est un mémorialiste. Leurs œuvres se complètent fort bien. Si précieuse que soit la *Description de l'Afrique* de Léon, elle ne renferme aucun document cartographique. Sa *Description* est immédiatement utilisée par les auteurs occidentaux, devenant rapidement une référence incontestable. La *Description* est la base solide sur laquelle s'est constitué un fond de savoir commun sur l'espace tunisien et son peuple.

Nous constatons qu'à partir du XVIe siècle, l'espace tunisien est décrit plus précisément dans des ouvrages spécialement consacrés à l'Afrique. Nous constatons encore le passage d'une géographie fondée sur des tables astronomiques, marquant les latitudes et les longitudes, à une géographie de description. Cette notion s'entend au sens large. Plus qu'une technique, elle est un type d'écriture et de discours.

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La troisième phase correspond à une nouvelle transition, cette fois-ci vers une cartographie de terrain. Celle-ci apparaît dans la région au XVIIIe siècle, avec l'œuvre du voyageur anglais Thomas Shaw. La carte de Shaw intitulée “ Royaume de Tunis ” (BnF, Département des cartes et plans, CPL GE DD-2987 (7988)) figure dans le récit de ses voyages d'études en Afrique du nord et au Moyen-Orient, *Voyages de M. Shaw, dans plusieurs provinces de la Barbarie et du Levant* en 1743 (BnF, 4-O3g-5 (2)). Cette cartographie est fondée sur des opérations de mesure effectuées directement sur le terrain et sur une analyse érudite et critique des auteurs antérieurs. Au milieu du XVIIIe siècle, l'espace tunisien est abordé au sein d'ouvrages de géographie consacrés à la “ Barbarie” comme les *Voyages de M. Shaw, dans plusieurs provinces de la Barbarie et du Levant* (1743). Le terme “barbarie” qui désigne toute l'Afrique du Nord est repris dans la littérature européenne des XVI^e^ et XVIII^e^ siècle.

L'échelle de description est l'indice d'un important changement dans la façon dont est décrit l'espace tunisien. Cette échelle s'est agrandie, depuis les descriptions du monde, aux descriptions de l'Afrique, puis enfin aux descriptions de la Barbarie. Cela s'explique par des préoccupations bien différentes au XVIII^e^ de ce qu'elles étaient à la Renaissance. L'espace tunisien est devenu l'objet d'appropriations et de contestations territoriales. L'ouvrage de Shaw répond aux nouvelles exigences de la société royale de Londres, société savante soucieuse de mettre à contribution les voyageurs pour la réalisation de son programme d'élargissement de la connaissance du monde.

Nous présentons, en premier lieu, les trois “ cartes-modèles” avec le principal cours d'eau de l'espace tunisien, oued Medjerda, repris au niveau du dessin. A l'époque moderne, le portrait de la Medjerda, le principal cours d'eau, change de forme à trois reprises comme
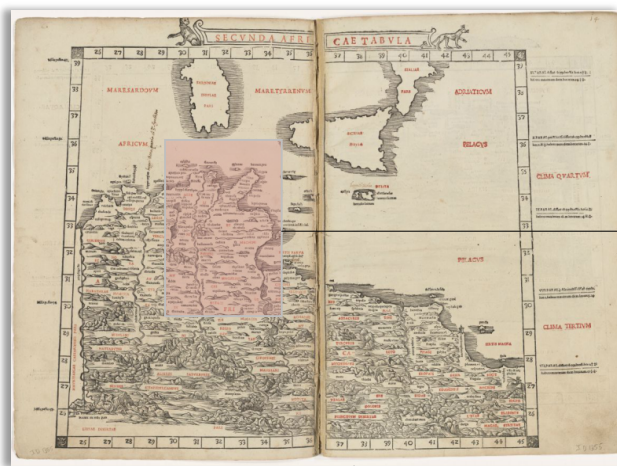
FIGURE 1
Secunda Africa Tabula (Sylvano B., 1511), *Claudii Ptholemaei, Liber geographiae*..., BnF, Département des cartes et plans, GE DD-1008 (RES).
Le Bagrada fl. des Anciens, mentionné par Sylvano est actuellement nommé Oued Medjerda.représenté avec une orientation fictive “sud-nord ”, (détail accentué au niveau du dessin par un trait bleu)

SOURCE: SAADA A., 2015

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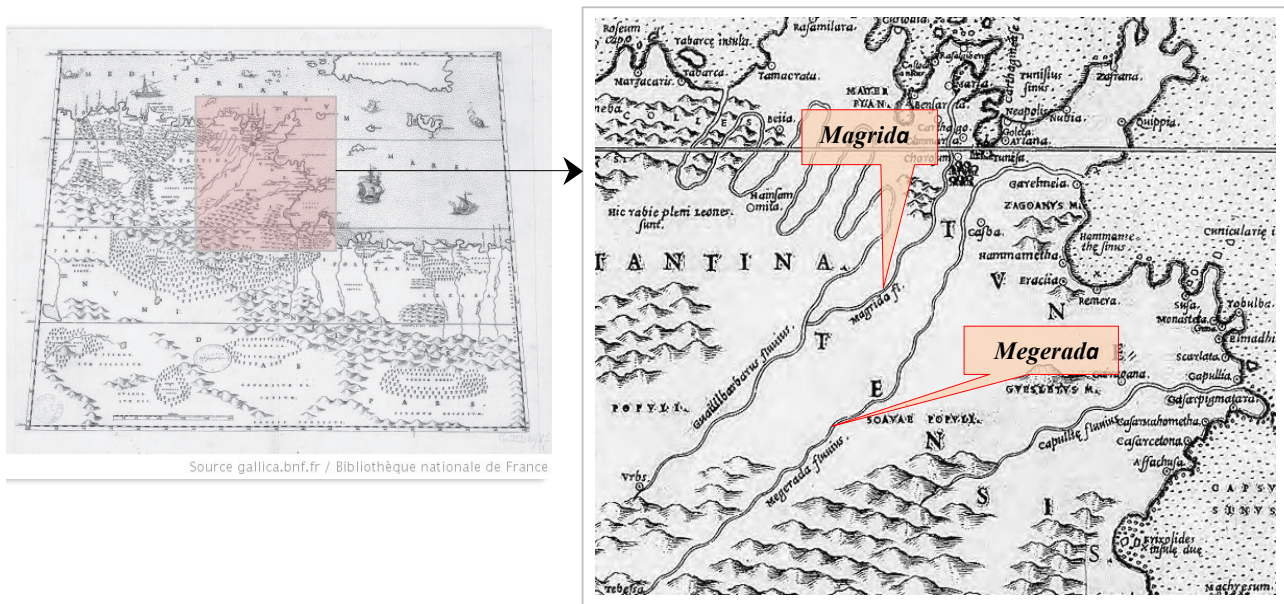
FIGURE 2 – Africa Tabula V (Sanuto L., 1558), *Geografia*, BnF, Département des cartes et plans, GE DD-2987 (7976)
Le dédoublement de la Medjerda (Magrida - Megerada) : une hydrographie inventée
SOURCE: SAADA A., 2015
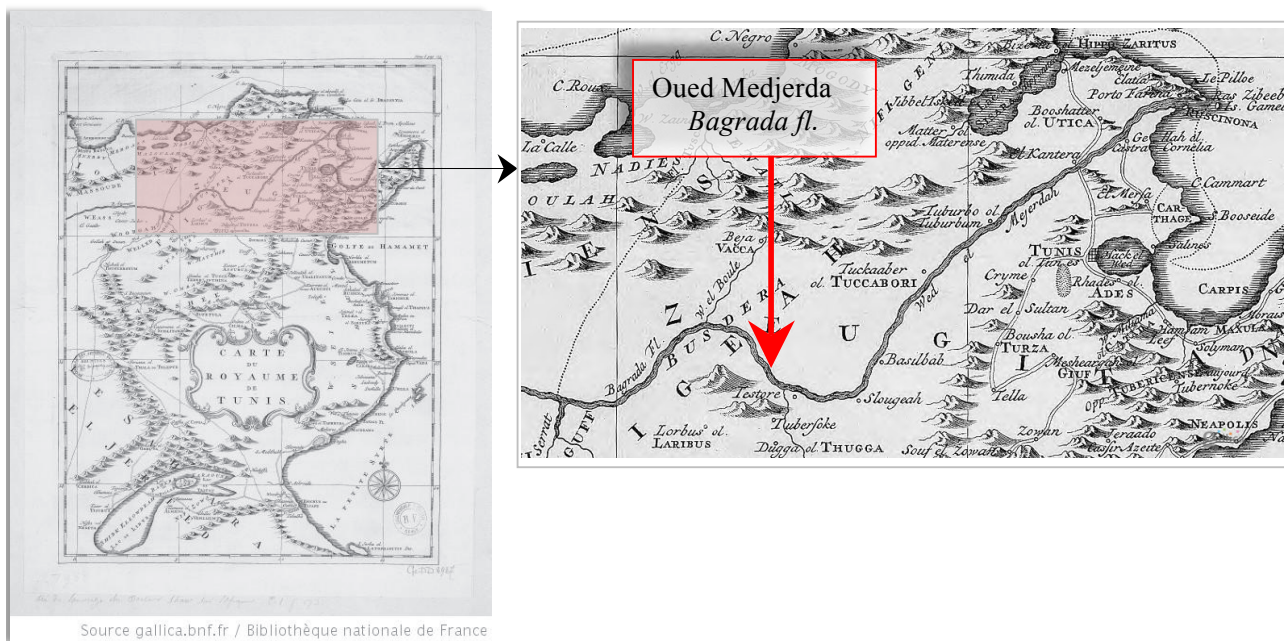
FIGURE 3 – ROYAUME DE Tunis (Shaw T., 1743), *Voyages dans la Barbarie et Levant*, BnF, Département des cartes et plans, CPL GE DD-2987 (7988). La direction d'oued Medjerda est plus exacte
SOURCE: SAADA A., 2015

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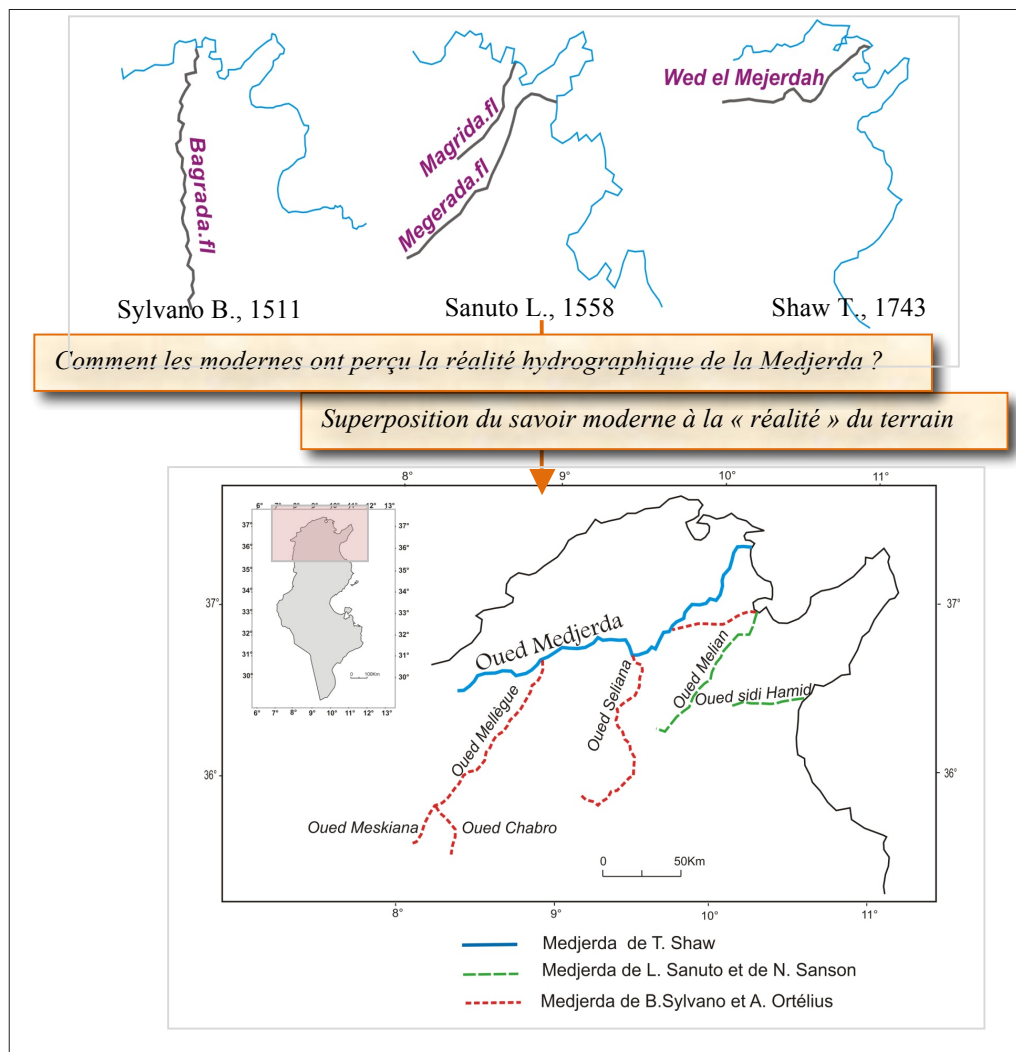
FIGURE 4
Le cours de la Medjerda entre l'image cartographique contemporaine et la perception des cartographes modernes occidentaux
SOURCE: SAADA A., 2015

en témoignent les " cartes-modèles". *Bagrada flumen* des anciens ou l'actuel Oued Medjerda dans sa direction fictive sud-nord dans la "Secunda Africae Tabula " (Sylvano B., 1511). Dans la carte "Africa Tabula V " (Sanuto L., 1558), nous remarquons le dédoublement de Medjerda : Magrida et Mejerada, les deux avec une direction est-ouest. L'image hydrographique dans la carte de Shaw est une forme typique de cette dernière période. La direction d'oued Medjerda est plus exacte.

Il s'agit bien d'une évolution d'une vision occidentale de la Medjerda. Nous soulignons l'aspect ponctuel et le caractère fragmentaire de la perception des cartographes occidentaux dans la géographie historique.

Nous exposons, en second lieu, l'évolution du tracé de la côte dans les "cartes-modèles". L'espace tunisien dans la "Secunda Africae Tabula " de Sylvano (1511) et l' "Africa Tabula V " de Sanuto (1558) présente toujours des tracés côtiers sinueux et stylisés. Certes, chez Sylvano puis Sanuto, l'image cartographique de la côte présente une forme certainement recopiée sur celle qu'indiquent des portulans antérieurs. Certaines parties comme le Cap Bon prennent encore des dimensions gigantesques. Mais, l'esquisse de la côte de Sanuto est moins déformée. Il se base essentiellement sur les portulans et les distances mentionnées par Léon dans sa *Description*. Léon donne des distances des différentes localités souvent par rapport à *Thunes*, mais parfois par rapport à des localités voisines par mille. A partir de ses observations et mesures directes, Shaw (1743) rectifie la ligne de la côte septentrionale, rompant avec le dessin

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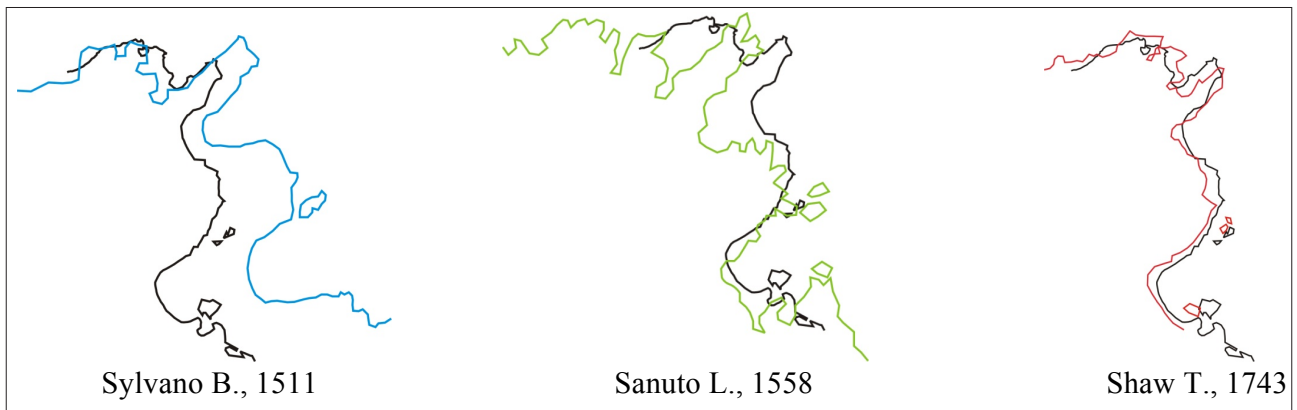
FIGURE 5 – Evolution du tracé de la côte de l'espace tunisien dans les cartes occidentales modernes : vers une précision remarquable
SOURCE: SAADA A., 2015

issu de la cartographie des portulans. Shaw a pu relever une "bonne" allure de la ligne côtière plus proche du tracé " réel ".Le tracé côtier aura pris deux siècles pour passer d'une forme stylisée et aléatoire à une forme plus nette, issue de calculs astronomiques plus précis.

La " Secunda Africae Tabula " de Sylvano (1511) marque l'omniprésence d›une toponymie ancienne, fidèle à la géographie antique de Ptolémée. Elle a conservé le tableau toponymique de Ptolémée donnant les coordonnées des principales villes de la " Secunda Africae Tabula ". Toutefois, l' " Africa Tabula V " (1558) de Sanuto témoigne d'un processus de modernisation de la nomenclature porté sur l'espace tunisien. Le latin disparaît progressivement. Elle se libère de l'emprise gréco-latine. La carte de " Royaume de Tunis " (1743) montre une dualité toponymique : deux substrats toponymiques, ancien et moderne. Le récit de voyage de Shaw offre une véritable richesse onomastique sur l'espace tunisien moderne. Ce voyageur présente les toponymes de l'espace tunisien en remontant dans l'histoire de cette région afin de préciser les différentes appellations. Il ne manque jamais de présenter les régions d'abord selon ce que disent les anciens comme Strabon, Pline et Ptolémée ou Tite-live. Néanmoins, l'organisation du texte Shaw pour l'espace tunisien se base sur ses observations. Il cherche à trouver les correspondances des toponymes modernes et anciens. Cela ne veut jamais dire que son texte doit dans une bonne partie aux anciens. Il s'agit d'une pure synthèse entre les deux strates toponymiques : ancienne et moderne. En outre, Shaw cite aussi les anciens dans un esprit critique pour mettre en valeur leurs lacunes et leurs erreurs. D'ailleurs, la carte de " Royaume de Tunis " de Shaw(1743) incarne le passage de la dénomination territoriale d'" Africa" au " Royaume de Tunis ". Elle propose ainsi une sorte de cadre qui reflète la réalité politique de l'espace tunisien de l'époque moderne. Le royaume de Tunis est une nouvelle notion territoriale qui entame son ascendance dans la cartographie. Quant à la terminologie latine des " Tabula", elle disparait des titres de cartes consacrées à l'Afrique.

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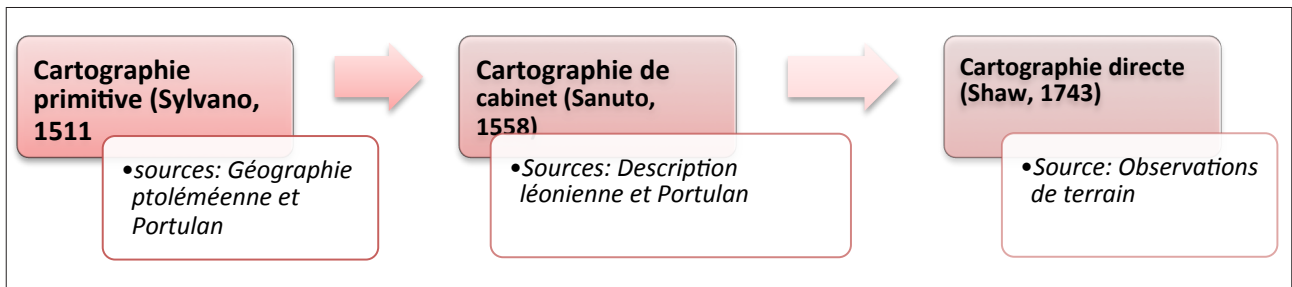
FIGURE 6 – Organigramme de l'évolution de l'image cartographique de l'espace tunisien vu de l'Occident : grandes phases et sources

TABLE 1 – Grille d 'interprétation de l'espace tunisien vu de l'Occident à travers les "cartes-modèles"

Phases historiques	Cartes- modèles	Toponymie	Hydrographie, principal cours d'eau : Oued Medjerda	Formes géopolitiques	Echelle de description	Aspect technique, usage
1 ère phase : La tradition ptoléméenne	-Secunda Africae Tabula, *Bernardo Sylvano, 1511*	Toponymie Ancienne	Bagrada.fl Direction sud-nord	AFRICA	Cosmographie universelle / Atlas du monde	Cartographie primitive astronomique (Table astronomique de latitude et longitude)
2 éme phase : Emergence d'une nouvelle tradition léonniéne	-Africa Tabula V, *Livio Sanuto, 1558*	Toponymie moderne	Dualité: *Megerada* & *Magrida* direction : sud - ouest		Description de l'Afrique	Cartographie de cabinet (description littérale)
3 éme phase : L'aube de la cartographie actuelle	-Royaume de Tunis, *Thomas Shaw, 1743*	Dualité toponymique (moderne et ancienne)	Wed Mejerdah direction : est-ouest	ROYAUME DE TUNIS (exclusif)	Description de Barbarie et levant	Cartographie directe de terrain (critique des descriptions antérieures)

SOURCE: SAADA A., 2015

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Après avoir déterminé et analysé les différentes cartes-modèles sous une approche historiographique, nous pouvons ensuite nous pencher sur une approche quantitative.

2. Approche quantitative de l'image cartographique de l'espace tunisien moderne vu de l'Occident

2.1. Apport et intérêt

L'étude des cartes modernes occidentales de l'espace tunisien ne se limite pas seulement à une approche historiographique sur les caractéristiques des grandes cartes-modèles basée sur une grille d'interprétation. Elle peut être complétée par une analyse quantitative. Il s'agit d'une nouvelle approche pour le couplage éventuel de l'histoire avec les procédés de la cartographie d'aujourd'hui. L'approche quantitative est une nouveauté en histoire de la cartographie. Nous observons depuis le début du XXI^e^ siècle, une approche des cartes historiques à l'aide d'outils d'analyse contemporains intéressant un nombre de plus en plus élevé de cartographes. Nous citons en guise d'exemple Waldo Tobler, Sylvie Rimbert, Bernhard Jenny, Evangelos Livieratos, Caterina Balletti, Chryssoula Boutoura. En outre, l'histoire de la cartographie est un domaine de recherche pleinement associé à la discipline géographique. Il paraît logique d'en renouveler la méthodologie par une approche quantitative, puisque la discipline en fait un usage de plus en plus large depuis plus d'une cinquantaine d'années.

L'approche quantitative viendra confirmer l'approche historiographique : elle pourra offrir un terrain fertile pour stimuler de nouvelles idées, selon une démarche comparative. Nous proposons d'incorporer la notion de déformation cartographique ou encore de distorsion cartographique. Cette dernière est en relation avec la notion du“ degré de transmission d'exactitude ” (Ratajski L., 1973) qui mesure la perte de l'information. En fait, nous observons sur les cartes-modèles modernes un écart, une distorsion mesurée par rapport
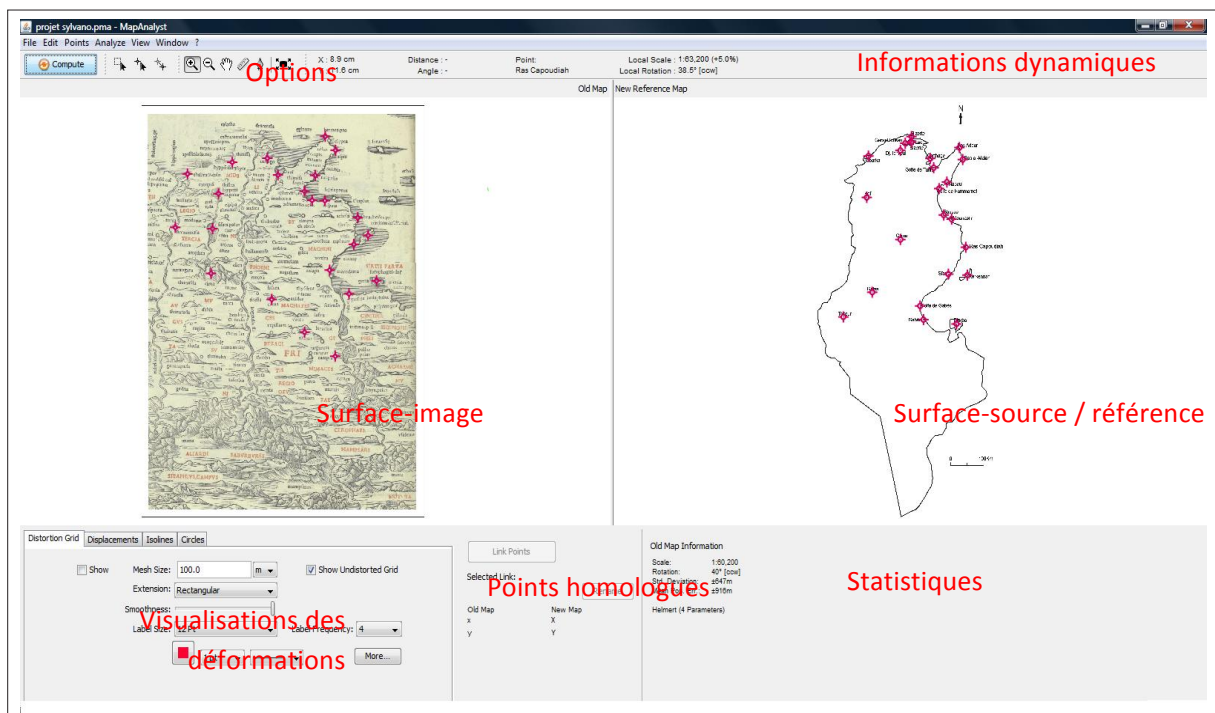
FIGURE 7 – Les différentes parties de la fenêtre principale de MapAnalyst. Exemple de la carte-modèle de Sylvano dans la fenêtre principale de MapAnalyst

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à la réalité, c›est-à-dire à la référence topographique universelle telle qu›elle est aujourd›hui établie. En effet, l'approche quantitative est une approche référentielle qui calcule l'exactitude et la précision géométrique de chaque carte-modèle moderne occidentale de l'espace tunisien en fonction de son écart par rapport à un référentiel unique (la Tunisie actuelle). L'approche quantitative présente aussi une comparaison entre les déformations et les distorsions des cartes-modèles modernes occidentales de l'espace tunisien. Cette approche quantitative qui porte sur les déformations des surfaces se base sur la méthode de la régression bidimensionnelle, développée par Tobler (Tobler W., 1994), permettant une comparaison entre deux surfaces : une surface-source supposée " exacte " correspondant à la Tunisie actuelle et une surface- image correspondant à la carte-modèle moderne occidentale de l'espace tunisien.

2.2. Logiciel MapAnalyst : analyse de la précision géométrique des cartes historiques

MapAnalyst est une application logicielle pour l'analyse de la précision des cartes historiques (Jenny B., Weber A., Hurni L., 2007). Les paires de points homologues sont sélectionnés pour construire des grilles de distorsion et des vecteurs de déplacement et relever certains indices statistiques.

2.3. Choix des points homologues

La méthode de la régression linéaire nécessite la détermination d'un certain nombre de points homologues (Tobler W., 1994). Ces points doivent être identifiés et repérés sans ambiguïté de la surface-source à la surface-image (Cauvin C., 1984). Les lieux relevés pour chaque carte sont les mêmes dans trois cartes-modèles pour faciliter la comparaison des résultats graphiques et statistiques.

Nous avons relevé vingt-trois lieux homologues. Nous aurions pu déterminer un nombre plus élevé. Mais pour certaines cartes, on dispose de tous les lieux, pour d'autres, il en manque quelques uns, soit parce qu'ils sont absents de la carte, soit parce que leur localisation est douteuse. L'adoption des mêmes points homologues. Ces points retenus devaient répondre à certaines contraintes, du fait de la méthode utilisée. En effet, il est nécessaire de retenir les lieux " réellement " homologues c'est-à-dire qu'il fallait pouvoir retrouver ces lieux sans ambiguïté d'une carte à l'autre (Badariotti D., 1987). Certains toponymes se caractérisent par un dédoublement et cristallisent autour d'eux des problèmes de correspondance et d'assimilation (Saada A., 2015). Devant telles situations, nous nous sommes abstenus de relever les localisations peu sûres. Celles-ci n'étant alors pas prises en compte dans notre analyse car elles peuvent aboutir à des résultats erronés. En guise d'exemple, nous avons exclu l'hydronyme Medjerda de l'échantillon bien qu'il soit le fleuve le plus important dans l'espace tunisien. La représentation cartographique de ce fleuve se caractérise, ainsi que nous l'avons vu, par un dédoublement dans la carte-modèle de Sanuto (Magrida et Megerada). Dans ce cas la comparaison de la carte-modèle de Sanuto avec la Tunisie actuelle et avec les autres cartes-modèles s'avère délicate et difficile (Saada A., 2015).

Certains points correspondent à des lieux urbains alors que d'autres correspondent à des lieux naturels. L'objectif est de tester l'exactitude et la précision des configurations naturelles par rapport aux configurations urbaines (Badariotti D., 1987). Les unités naturelles qui se prêtent le mieux à cet exercice sont des indentations côtières, des lacs, des îles et des montagnes. La majorité des points naturels correspond à des indentations côtières vue la spécifité du dessin du tracé côtier tunisien malgré sa variation d'un cartographe à un autre. Le tracé côtier tunisien se caractérise par un certain nombre de formes remarquables, en creux ou en saillie. Parmi les formes en creux, ou concavités, nous repérons en particulier les trois grands golfes, de Tunis, d'Hammamet et de Gabès. Les formes en saillie ou promontoires correspondent notamment aux Ras Addar, Ras Al-Melah et Ras Capoudiah. D'autres points naturels ne sont pas liés à l'allure de la côte. Ils correspondent aux principales îles comme Kerkennah et Djerba. Nous avons enrichi la liste des points naturels par la montagne d'Ichkeul et les deux lacs environnants : lac Ichkeul et lac de Bizerte.

Et si la majorité des points choisis se répartissent sur le littoral tunisien, cela ne nous semble pas un inconvénient dans la mesure où la côte a fait prioritairement

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Points urbains	Points naturels
Kef	Dj. Ichkeul
Tabarka	Lac Ichkeul
Bizerte	Lac Bizerte
Carthage	Golfe de Tunis
Nabeul	Ras Addar
Sousse	Ras Al-Melah
Mounastir	Golfe de Hammamet
Sfax	Ras Capoudiah
Gabès	Kerkennah (îles)
Gafsa	Golfe de Gabès
Tozeur	Djerba (île)
Gilma	-

TABLE 2 – L'échantillon des points homologues
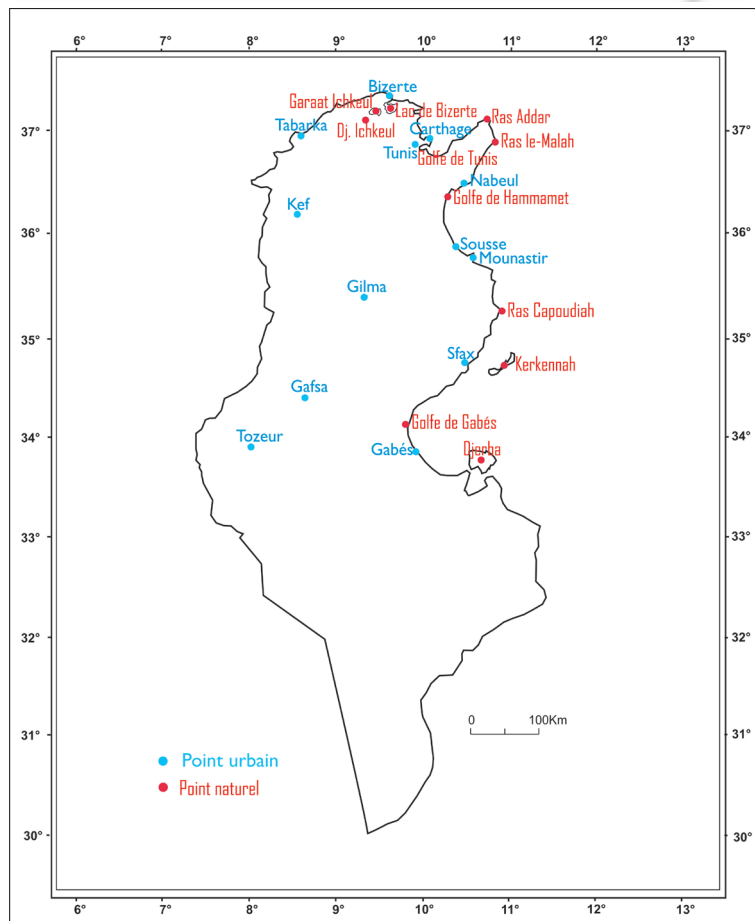
FIGURE 8 – localisation des points homologues urbains et naturels
SOURCE: SAADA A., 2015

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l'objet de la représentation cartographique de la part des occidentaux à l'époque moderne, et que le tracé littoral peut permettre de déterminer l'image cartographique de l'espace tunisien dans son ensemble (Saada A., 2015).

TABLE 3 – Transformation géométrique affine 6-paramètres de la carte-modèle de Sylvano

Paramètres de transformation	Résultats
Echelle horizontale	1/47000
Echelle verticale	1/65000
Rotation X (°)	33
Rotation Y (°)	44
Ecart-type (m)	564
Erreur moyenne de position (m)	798

TABLE 4 – Transformation géométrique affine 5-paramètres de la carte-modèle de Sanuto

Paramètres de transformation	Résultats
Paramètres de transformation	Résultats
Echelle horizontale	1/30500
Echelle verticale	1/53600
Rotation (°)	12
Ecart-type (m)	457
Erreur moyenne de position (m)	646

TABLE 5 – Transformation géométrique Helmert 4-paramètres de la carte-modèle de Shaw

Paramètres de transformation	Résultats
Echelle	1/34600
Rotation (°)	5
Ecart-type (m)	127
Erreur moyenne de position (m)	180

2.4. Les résultats statistiques des transformations géométriques

En premier lieu, nous présentons les résultats globaux relatifs à l'exactitude des cartes-modèles. La transformation adéquate choisis est celle qui a la plus petite valeur d'écart-type.

* La transformation Affine-6-Paramètres pour le modèle de Sylvano qui montre un cisaillement géométrique.

* La transformation Affine-5-Paramètres pour le modèle de Sanuto qui montre un étirement unilatéral.

* La transformation de Helmert-4-Paramètres pour le modèle de Shaw qui montre une déformation homogène.

En second lieu, nous exposons les résultats détaillés afin de relever les tendances régionales de déformations. Les variables utilisées sont celles de la rotation et l'échelle qui permettent de caractériser la variabilité directionnelle des localisations.

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TABLE 6 – Les variations locales de l'échelle et la rotation des points homologues dans les trois cartes-modèles de l'espace tunisien vu de l'Occident

Variables dans les cartes modèles / Points homologues		Sylvano (1511)		Sanuto (1558)		Shaw (1743)	
		Rotation locale (°)	Echelle locale (%)	Rotation locale (°)	Echelle locale (%)	Rotation Locale (°)	Echelle locale (%)
1	Kef	40.2	-2.3	40.1	+120.7	8.0	-5.1
2	Tabarka	37.4	-4.8	37.7	71.3	12.3	5.4
3	Bizerte	37.7	-3.9	29.9	106.7	10.6	0.4
4	Carthage	37.5	-2.1	34.2	98.5	10.7	0.5
5	Nabeul	37.6	1.3	31.4	59.9	9.1	3.3
6	Sousse	38.9	1.9	24.7	45.5	0.8	9.8
7	Monastir	38.6	2.6	21.7	63.1	1	8.2
8	Sfax	39.8	5.4	18	58.4	1.4	9.0
9	Gabès	42.5	6.3	42.8	41.7	17.7	9.4
10	Gafsa	46.1	7.2	84.9	-17.8	2.4	6.5
11	Tozeur	45.5	5.3	84.9	-17.8	6.5	21.0
12	Gilma	44.7	3.3	83.4	38.4	2.7	8.5
13	Dj .Ichkeul	43.3	0.2	34.8	86.0	12.9	3.3
14	Lac Ichkeul	41.0	-1.6	28.9	105.8	12.1	1.4
15	Lac de Bizerte	39.2	-3.0	27.9	107.3	11.4	0.9
16	Golfe de Tunis	38.2	-1.1	34.3	75.8	11.6	0
17	Ras Addar	35.9	1.1	0.2	-20.8	10.1	2.9
18	Ras Al-Melah	36.2	2	8.1	-9.2	10.8	2.8
19	Golfe de Hammamet	38.6	1.4	31.1	10.8	6.9	6.7
20	Ras Capoudiah	38.4	5	21.2	80.1	4.5	11.5
21	Kerkennah	39	6	24.3	89.6	6.8	22
22	Golfe de Gabès	41.8	4.6	47.7	47.2	10	-3.9
23	Djerba	41.1	7.1	27.4	66.3	24.6	-8.3

SOURCE: SAADA A., 2015

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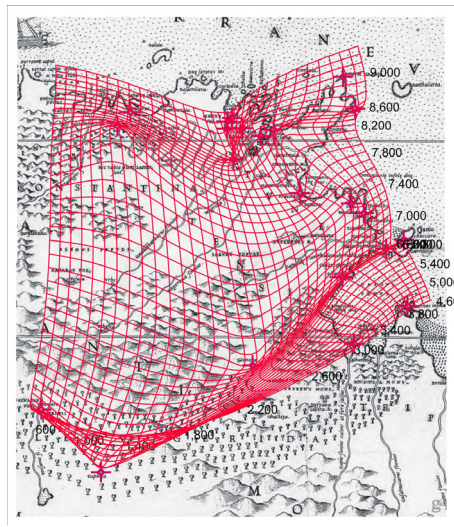
FIGURE 9 – Grilles de distorsions des "cartes- modeles" de l'espace tunisien moderne vu de l'Occident
SOURCE: SAADA A., 2015
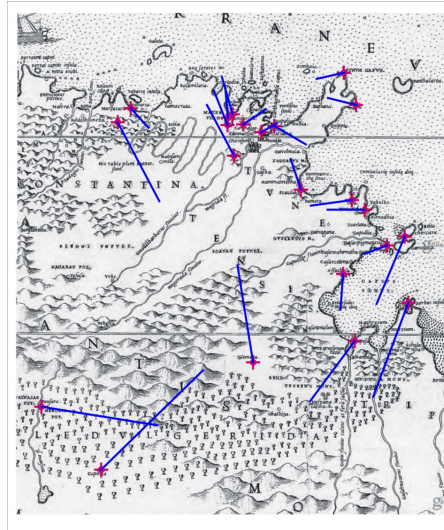
FIGURE 10 – Vecteurs de déplacements dans les "cartes- modèles" de l'espace tunisien moderne vu de l'Occident
SOURCE: SAADA A., 2015

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2.5. Les résultats graphiques des déformations

2.5.1. Les grilles de distorsions

La grille de distorsion de l'espace tunisien de Sylvano effectue une rotation de 33° dans le sens des X et 44° dans le sens des Y, avec un maillage de 100m. Les déformations globales du modèle de Sylvano sont exagérées puisque la rotation est relativement importante, vers 40°. L'échelle horizontale est de 1/47000 alors que l'échelle verticale est de 1/65000.

La grille de distorsion de l'espace tunisien de Sanuto marque une rotation de 12°, une rotation inferieure à celle de Sylvano, avec un maillage de 100m. L'échelle verticale est de 1/53600. Elle est plus petite que l'échelle horizontale qui est de 1/30500.

La grille de distorsion de l'espace tunisien de Shaw effectue une rotation negligeable de 5° avec un maillage de 100m. L'échelle est de 1/34600. Les indices de variabilité, comme l'écart-type et l'erreur moyenne de position, sont beaucoup moins importantes que celles des " cartes-modèles" de Sylvano et Sanuto.

2.5.2. Les vecteurs de déplacement

Un vecteur de déplacement est l'écart entre l'image et le référentiel pour chaque carte-modèle de l'espace tunisien vu de l'Occident. Il est l'écart entre les deux localisations, ou encore la différence entre les deux espaces.

Les vecteurs de déplacement de l'espace tunisien de Sylvano montrent les distances franchies par les lieux. Les déplacements sont importants : la carte des vecteurs de déplacement semble contenir de longs vecteurs de déplacement. Alors que, Sanuto a réduit les déplacements des lieux, mais il a conservé les directions de ces déplacements ainsi que leur rapport. Il s'agit d'une image de l'espace tunisien incontestablement améliorée. Les vecteurs de déplacement dans l'espace tunisien de Shaw montrent une variabilité faible. Tous les lieux sans exception, ont réduit les déplacements.

2.5.3. Tendances d'évolution

Les principaux indices de variabilité des cartes-modèles de l'espace tunisien moderne comme l'écart-type et l'er-
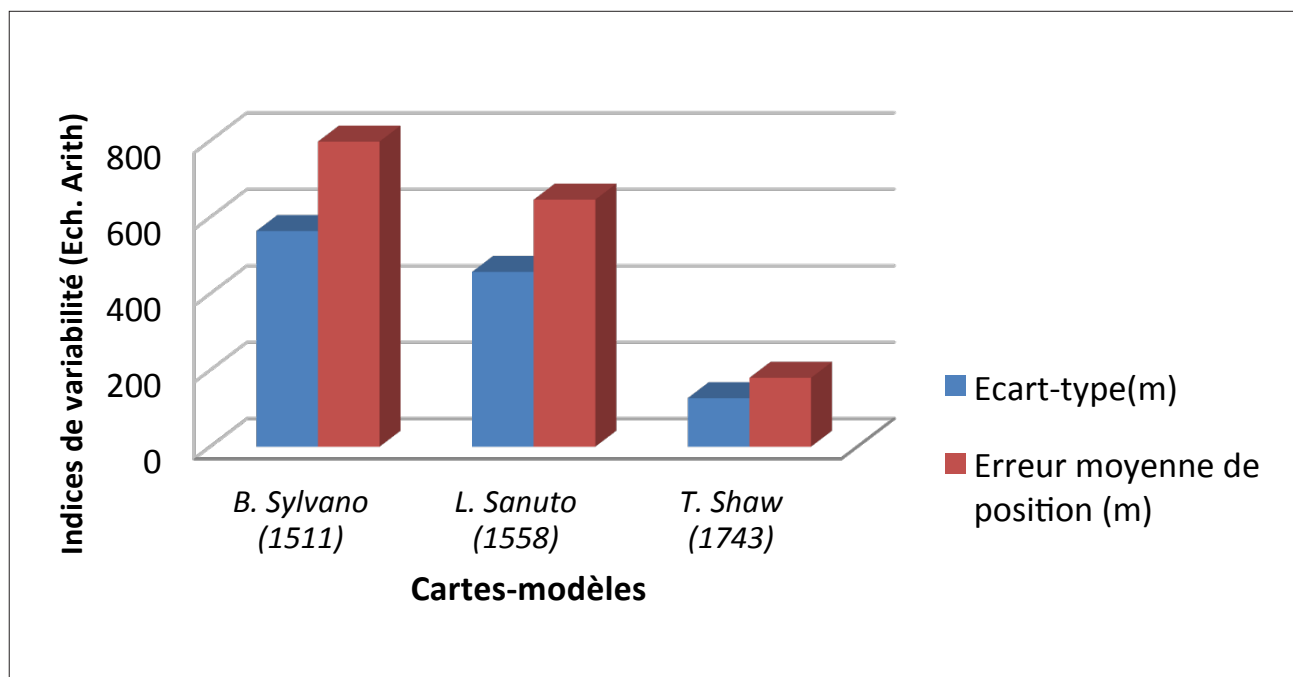
FIGURE 11- L'évolution des indices de variabilité des "cartes- modèles" de l'espace tunisien moderne vu de l'Occident
SOURCE: SAADA A., 2015

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reur moyenne de position reflètent une évolution vers une exactitude bien remarquable. Le graphique ci-dessus met en relief la faible inexactitude dans la carte-modèle de Shaw. Elle correspond à une tendance visiblement profonde de murissement des représentations cartographiques modernes de l'espace tunisien.

Cette carte d'inspiration anglaise de Shaw brise les cartes d'ascendances italiennes représentées par Sylvano et Sanuto. Les cartes élaborées par ces deux cartographes se ressemblent mutuellement au niveau du découpage, mais diffèrent au niveau du fond et de la forme. Elles sont deux représentations originales correspondant chacune à une sorte de palier dont on peut distinguer une certaine continuité dans l'évolution de l'image cartographique moderne occidentale.

Toutefois, la carte de Shaw est une sorte de rupture marquant une discontinuité dans l'évolution. Nous pouvons qualifier cette œuvre cartographique de " plus moderne " car elle s'approche de l'image-source (Tunisie actuelle). Elle renouvelle l'état des connaissances géographiques et cartographiques.

Chaque carte-modèle se contente de reprendre des éléments que l'on tenait pour acquis, et corrige une partie des " erreurs " accumulées, qui sont sources potentielles de déformations. Ce phénomène va transparaitre plus nettement à travers une lecture commentée des résultats aussi bien statistiques que graphiques.

2.6. Lecture commentée des résultats

La grille de distorsion de la carte-modèle de Sylvano met en évidence des distorsions importantes dans le sens des Y que dans le sens des X. La carte-modèle de Sylvano semble donc être globalement plus inexacte en latitude qu'en longitude, de façon surprenante. Certes, ce modèle correspond à un renouveau de la tradition ptoléméenne, mais l'influence de Ptolémée ne transparaît pas à travers ce constat, puisque le savant grec exagérait plutôt les longitudes que les latitudes. La longitude est, on le sait, plus difficile à déterminer astronomiquement que la latitude, avant le XVIIIe siècle. Si un tel aspect ne se retrouve pas dans la carte-modèle de Sylvano, cela indique sans doute qu'elle doit plus à la tradition des cartes nautiques qu'à l'influence de la science antique. En outre, la carte des vecteurs de déplacement de l'espace tunisien de Sylvano montre que la variabilité des déplacements est surtout importante dans l'espace tunisien intérieur. Mis à part les vecteurs relatifs à Ras Addar, à Ras El-Melah et au golfe de Gabès, nous constatons bien que les vecteurs de déplacement de forte variabilité se concentrent surtout à l'intérieur de l'espace tunisien. Les lieux du littoral ont une variabilité plus faible que ceux de l'intérieur. Certes, la côte avec ses lieux dans la carte-modèle de Sylvano offre une image minutieuse du contour et des îles en s'inspirant des cartes marines, puisque les indications de Ptolémée ne permettaient pas un tracé très précis. Mais, la carte-modèle de Sylvano localise les lieux à l'intérieur de l'espace tunisien avec une grande fidèlité à Ptolémée. Le propos des cartes marines est en effet très différent de celui des cartes ptoléméennes. En ce qui concerne l'espace tunisien, du strict point de vue descriptif, les cartes marines peuvent donc être considérées comme un net progrès par rapport à la localisation des lieux fournie par *la Géographie* de Ptolémée. La carte-modèle de Sylvano permet de confronter le présent au passé, une connaissance empirique à une représentation mathématisée de l'espace tunisien.

Les cartes de grille de distorsion et des vecteurs de déplacement de la carte-modèle de Sanuto mettent logiquement en évidence des distorsions qui se réduisent par rapport à la carte-modèle de Sylvano. Dans la carte-modèle de Sanuto, les rotations apparaissent moins homogènes que sur la carte-modèle de Sylvano qui présente une remarquable homogénéité régionale des rotations (Table 6). Les rotations locales des lieux dans la carte-modèle de Sylvano présentaient des situations assez voisines. En revanche, celles de la carte-modèle de Sanuto présentent davantage de valeurs extrêmes. En effet, la rotation est très élevée au sud de l'espace tunisien surtout à Tozeur et Gafsa avec une rotation de 84.9° et une échelle de -17.8%, alors que les lieux de Ras Addar et de Ras El-Melah ont une rotation très faible voire négligeable, respectivement de 0.2° et 8.1°. Leurs échelles locales sont aussi négatives de -20.8% et -9.2%. Les échelles locales augmentent d'une façon extrême au nord de l'espace tunisien surtout au Kef de 120.7%, à Bizerte de 106.7%, ainsi que pour ses deux lacs : le lac Ichkeul et le lac de Bizerte ont des échelles locales très élevées, respectivement de 105.8% et 107.3%. En outre,

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TABLE 7 – Comparaison entre les distances des importantes localités selon Ptolémée et la réalité du terrain
SOURCE: SAADA A., 2015

Localités	Distance de Carthage selon Ptolémée (Km)	Distance réelle (Km)	Ecart par rapport à la réalité (km)	Pourcentage d'erreur
Sousse	128.3	118	10.3	8.7
Monastir	140	127	13	10.2
Kairouan	148.4	132	16.4	12.4
Gilma	249.3	193	56.3	29.1
Nabeul	79	58	21	36.2
Tabarka	251.6	140	111.6	79.7
Kef	328.9	180	148.9	82.7
Sers	318.2	146	172.2	117.9
Bizerte	163.3	61	102.3	167.7

TABLE 8 – Comparaison entre les distances des importantes localités selon Léon et la réalité du terrain
SOURCE: SAADA A., 2015

Localités	Distance de Thunes (mille)	Distance de Thunes (km)	Distance réelle (km)	Pourcentage d'erreur	Ecart par rapport à la réalité (km)
Bizerte	35	64	60	4	6.6
Casba	24	44.5	51	-6.5	12.7
Gammart	8	14	16	-2	12.5
Kairouan	100	185	125	60	48
Souse	100	185	116	69	59.4
Nabeul	12	22	63	-41	65
Urbs	190	305	162	143	88.2
Ariana	8	14	7	7	100
Hammamet	50	92	20	72	360

TABLE 9 – Comparaison entre les distances entre importantes localités selon Léon et la réalité du terrain
SOURCE: SAADA A., 2015

Localités voisines	Distance entre localités (mille)	Distance entre localités (km)	Distance réelle en Km	Ecart par rapport à la réalité (km)	Pourcentage d'erreur
Beja/Mer mediterrannée	25	46	47	-1	2.1
Gabès/El Hamma	15	27	29	-2	6.8
Kairouen/ mer mediterrannée	36	66	51	15	29.4
Montagne Ouesslet/ Kairouen	12	22	40	-18	45
Touzeur/ mer méditerranée	300	480	258	222	86
Gafsa/ mer mediterrannée	300	480	207	273	131.8

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les vecteurs de déplacement de l'espace tunisien de Sanuto sont moins importants que ceux de la carte de Sylvano. Il s'agit d'une image de l'espace tunisien incontestablement améliorée. Nous relevons une conformité globale dans la répartition des vecteurs de déplacement, sur les cartes-modèles de Sanuto et de Sylvano. Comme dans la carte-modèle de Sylvano, l'intérieur continue à accueillir les lieux qui ont une variabilité importante. Mis à part quelques cas, les lieux qui s'éloignent du littoral sont ceux qui obtiennent les plus grands vecteurs, et par conséquent les plus fortes variabilités. Ces ressemblances éventuelles entre les deux cartes-modèles italiennes confirment sans doute que leur contenu reflète une communauté de sources, et en particulier des informations issues de la culture nautique méditerranéenne.

Ainsi, nous relevons des différences régionales de déformations surtout à l'intérieur de l'espace tunisien qui nous poussent à s'interroger sur leurs origines : d'où viennent les variations régionales ? Cette question donne de nouveaux éclairages sur les cartes étudiées. Nous pourrons par exemple faire une hypothèse quant aux sources utilisées par les cartographes, sans doute de qualité inégale, du mode d'élaboration du savoir et des modalités de son évolution. Les tendances régionales de déformations évoluent selon les sources disponibles : données mathématiques issues de la traduction en latin de la *Géographie* ptoléméenne, indications encyclopédiques de cabinet grâce la publication de la *Description* de Léon. Nous l'avons indiqué, la carte de Sylvano s'inscrit dans le cadre d'une tradition ptoléméenne, alors que la carte de Sanuto marque l'émergence d'une nouvelle tradition de Léon l'Africain. Nous relevons ici les distances données par Ptolémée dans sa *Géographie* et Léon dans sa *Description* pour certaines localités pour fins de comparaison. Dans les tableaux ci-dessus, nous reprenons les distances indiquées par Ptolémée et Léon, avec leur conversion en kilomètres. Nous calculons aussi leur écart par rapport à la réalité, ainsi que leur pourcentage d'erreur pour juger dans quelle mesure une carte-modèle s'inspire d'une de ses sources.

Les cartes des grilles de distorsion et des vecteurs de déplacement de Sylvano et Sanuto (Figures 9 et 10) montrent respectivement une concomitance avec les distances calculées ou fournies par Ptolémée et Léon. Nous remarquons que les grilles se déforment aux régions où les localités ont les pourcentages d'erreur important. En effet, d'après les données ptoléméennes, la table 7 montre que Bizerte, Tabarka, Sers et kef ont les pourcentages d'erreur les plus élevés. Ce sont les zones de déformations dans l'espace tunisien de Sylvano qui se localisent au nord-ouest. En outre, d'après les données de Léon, la table 8 montre qu'Urbs, Ariana et Hammamet ont les pourcentages d'erreur les plus élevés. La table 9 montre aussi que Gafsa et Tozeur ont les pourcentages d'erreur les plus élevés. Nous avons noté une rotation très élevée de ces localités (Table 6).

Toutefois, les tendances régionales que nous avons déjà soulevées, entre le littoral et l'intérieur dans les cartes-modèles de Sylvano et de Sanuto disparaissent dans la carte-modèle de Shaw au profit de tendances d'autre nature. Il n'est plus possible de les distinguer en raison de la très faible amplitude des vecteurs de déplacement. Nous relevons une remarquable homogénéité régionale de déplacement. En fait, les vecteurs de déplacement dans l'espace tunisien de Shaw montrent une variabilité si faible qu'ils couvrent tout juste le point représentant la localisation exacte. Cette réduction remarquable témoigne d'une forte amélioration par rapport aux cartes-modèles précédentes. La carte de grille de distorsion de la carte-modèle de Shaw montre que la rotation est très élevée au sud de l'espace tunisien à Djerba et Gabès. Leurs rotations sont respectivement de 24.6°et de 17.7°. Nous voyons que cette zone s'éloigne généralement de ses itinéraires et les lieux placés suivant ses propres observations. Certes, la carte de " Royaume de Tunis" de Shaw est plus déformée dans les régions qu›il n›a pas personnellement parcourues sachant que les itinéraires de Shaw figurent sur sa carte en implantation linéaire. Mais, elle semble très proche du profil de l'espace tunisien auquel on est si habitué.

En définitive, l'approche quantitative correspond à l'une des fonctions principales de la cartographie : montrer, non seulement ce qui est visible, mais aussi aller au-delà en faisant apparaître les configurations sous-jacentes ou les structures cachées. Si l'approche historiographique structurale utilise la carte comme moyen d'illustration, l'approche quantitative utilise la carte comme moyen de simulation. Par ailleurs, les approches historiographique et quantitative se rejoignent par complémentarité. Si l'approche historiographique montre

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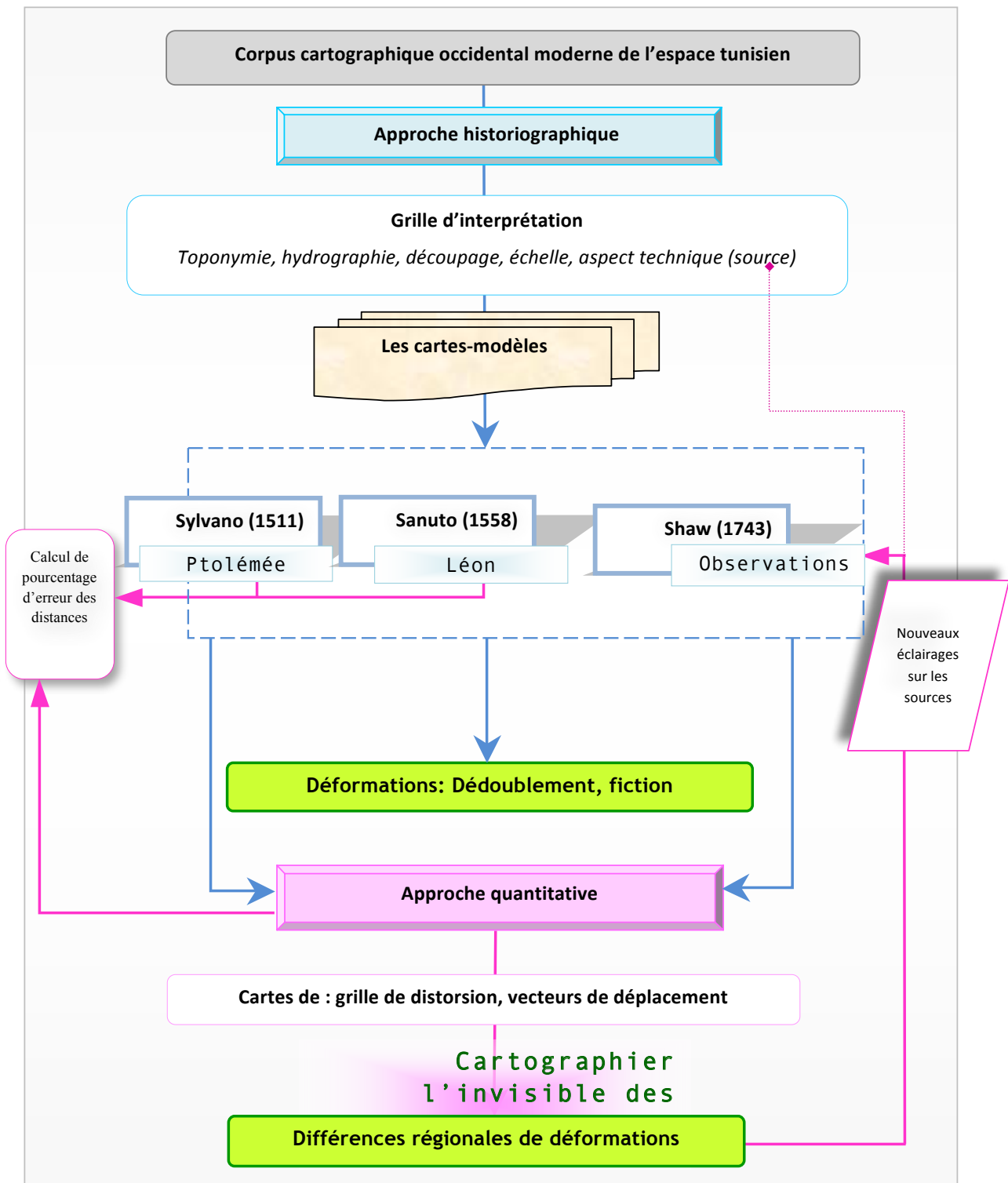
FIGURE 12 – Organigramme récapitulatif de la complémentarité entre l'approche historiographique et l'approche quantitative
SOURCE: SAADA A., 2015

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que la carte occidentale de l'espace tunisien a subi une série de déformations dont les principales sont le dédoublement et la fiction, l'approche quantitative montre la régionalisation. En outre, l'approche quantitative peut servir entre autres à renouveler le questionnement historique en suscitant de nouvelles réflexions ou en ouvrant de nouvelles pistes de recherche historique.

Conclusion

Les cartes-modèles de l'espace tunisien correspondent à trois étapes fondamentales qui se succèdent du XVIe au XVIIIe siècle, et qui matérialisent un état des connaissances géographique. Chaque carte-modèle est une sorte de palier qui renouvèle l'état de l'image cartographique de l'espace tunisien.

Cette étude peut favoriser d'autres réflexions de fond rapportées à l'espace tunisien moderne, relatives à d'autres thématiques de la géographie historique, comme l'évolution des paysages ou encore l'environnement naturel. Ces contributions peuvent enrichir la géographie historique de l'espace tunisien qui demeure un champ de recherche ouvert, susceptible d'explorations complémentaires. Son apport à la connaissance historique est important puisqu'elle est mitoyenne avec les deux grandes disciplines, l'histoire et la géographie. Elle en réunit les méthodes, en utilise les instruments et en exploite les données.

L'approche quantitative des cartes historiques est une voie féconde, qui correspond à un renouvellement important de la méthodologie. Elle fait apparaître les structures cachées ou invisibles de déformation dans les cartes-modèles occidentales de l'espace tunisien ainsi que leurs relations sous-jacentes, selon un niveau global puis un niveau local. Basée sur la transformation géométrique, la précision des cartes-modèles est calculée et analysée par le biais de différentes visualisations de déformation de l'espace qui permettent d'approfondir les interprétations géo-historiques. Une telle approche pourrait être également appliquée à des cartes ottomanes modernes de l'espace tunisien. C'est aussi l'une des perspectives de recherches qui compte être développé sur l'image cartographique moderne de l'espace tunisien.

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Reti territoriali nel Mediterraneo: territorio vs. popolazione*
*Territorial grids in the Mediterranean: space versus population**

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Riassunto

Questo articolo esamina come fare confronti internazionali su scala mediterranea in una prospettiva demografica e geografica. Questo studio si concentra sulla variabilità osservata delle superfici e delle popolazioni di diverse reti disponibili per i paesi mediterranei.
Ci chiediamo in primo luogo su ciò che rende rilevante una griglia rispetto ad un'altra. Inoltre ci proponiamo di utilizzare l'autocorrelazione spaziale come indicatore di qualità delle caratteristiche statistiche e spaziali di una griglia per una data variabile. Basandoci su un confronto tra diverse griglia infra-nazionali, tra cui due reti realizzate ad hoc, esploriamo la variabilità generata dalla griglia prescelta su una variabile che unisce lo spazio e la popolazione: la densità. I risultati sottolineano l'importanza di questo tipo di approccio prima di qualsiasi opera di confronto internazionale e ricorda la potenziale importanza che può assumere il MAUP (Modifiable Areal Unit Problem) negli studi spaziali.

Parole chiave

Densità, reti territoriali, Mediterraneo, autocorrelazione spaziale, MAUP, cartografia, SIG

Abstract

This paper explains how to make international comparisons on a Mediterranean scale for demographic and geographical themes. This study deals with the variability observed of surfaces and populations of the grids available of the Mediterranean countries.
First, we wonder what makes the relevance of a grid compared to another. Then, we use spatial autocorrelation as an indicator of spatial and statistical characteristics of a grid for a specific variable. We create two grids for the occasion. Comparing several grids, we explore the variability generated by the variable of population density. The results show the importance of this kind of approach before beginning any international comparison. They also remind the importance of MAUP in spatial studies.

Keywords

Density, territorial grid, the Mediterranean, spatial autocorrelation, MAUP, cartography, GIS

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1. Introduction

While data of all types is becoming increasingly available and although it is usually geo-referenced and the tools are easier to manage, there is often little reflection on the way it is used. This is due to a lack of user training or simply negligence. Among this data, that relating to population is more easily accessible (census, surveys) and is often linked to suitable map collections.

For this reason, it is tempting to study the spatial dimensions of the phenomena under consideration and this extends across all disciplines and beyond academia. Mapping is made accessible to everyone. Even though most geographers and cartographers are aware of the pitfalls of mapping and the importance that should be placed on prior analysis of the variables (statistical study and discretisation), they very rarely focus on the grids that constitute the framework of their study.

This means that the necessary deconstruction of the grids is carried out all too rarely. People do not question often enough the consequences of the default choices made. We will examine how, in addition to an academic exercise, this is also a broader reflection on the 'proper' level of analysis which is then presented to us. Secondly, we will examine possible alternatives for determining this proper level. Finally, we will apply our remarks and recommendations to a pan-Mediterranean analysis of population densities in order to provide a concrete demonstration of the effect on perceptions and measurements of the phenomenon of the grids adopted.

2. What is a proper level of analysis?

Until recently, the availability of data limited the possible levels of observation to a great extent. However, wider dissemination of data means this is becoming less the case. Whereas the lack of data previously left the researcher with little choice about the level of study, the diversity of scales and levels of observations that are now available mean the researcher is obliged to make a selection. Although having a choice of levels of representation may look like a comfortable position, it raises new methodological problems. At the forefront of these is what most geographers have been calling the Modifiable Areal Unit Problem (MAUP) for 40 years.

2.1 The MAUP and its implications in a geographic search

The MAUP is a recurring theme in spatial analysis. Stan Openshaw (and Peter Taylor) devised the term MAUP in their 1979 article: "a million or so correlation coefficients: three experiments on the Modifiable Areal Unit Problem." The idea, later developed in more detail (Openshaw, 1984), is that statistical measurements of spaces are directly dependent on the resolution and shape of the grids used. These two effects are therefore usually differentiated by using the terms scale on one hand, and zoning effect on the other.

The scale effect emphasizes the variations experienced by data when the level of observation is altered, specifically, the statistical smoothing effect that occurs when data is aggregated. The disappearance of detail as it "ascends" the geographic levels and its contribution to an understanding of the phenomena and their structures have already been well highlighted. Arbia, for example, when he alludes to the possibility of a second law of geography, suggests that: "Everything is related to everything else, but things observed at a coarse spatial resolution are more related than things observed at a finer resolution." (Arbia et al., 1996)[1].

The zoning effect highlights the effect of forms of territorial breakdown on the results. Thus, during the aggregation process, the number of possibilities for linking the grids and forming new ones and the fact that a large number of grids exists assume greater importance. The number of possible combinations increases very rapidly and each solution produces different values for the newly obtained grids. The zoning effect characterizes administrative divisions (particularly electoral divisions) and is added to the scale effect.

The MAUP affects measurements and thus it has implications for statistics. Thus, Gehlke & Bielh (1934, p. 170), without referring to the MAUP, already noted

1 As a reminder, the first law of geography formulated by Tobler is: "Everything is related to everything else, but near things are more related than distant things." (Tobler, 1970).

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that "variations in the size of the correlation coefficient seem conditioned upon changes in the size of the unit used, with a smaller value of *r* associated with the smallest unit rather than with the largest. Various ways of grouping have considerable influence on the *r*, as well as has the size of the area."

Even if the issue is a longstanding one, we can see that the problem remains topical. The zoning effect remains little studied and should certainly be examined in greater detail. The scale effect is easier to measure but it also merits a specific study in order to take into account its effect on measurements (Reynolds, 1998).

There is also another issue: discovering whether the MAUP, rather than constituting a 'problem', is actually a constituent of spatial data and, as such, an item of information rather than a problem (Grasland & Madelin, 2006). Indeed, once one is aware of the existence of this phenomenon of variability as a result of aggregation, exploring it can represent a new source of information.

Behind these questions lies a more general question: whether on any given scale there is a level of analysis which is better than the others. Before returning to what we might mean by "better", we should recall that this type of question has already been explored.

When seeking an optimal grid, Openshaw (1977) proposed a method of automatic partition to detect which spatial sets are suitable for a particular purpose. He showed that the optimal zoning for one variable is not necessarily the same for another, and that the results for a study variable implicitly depend on the level and scale at which they are measured. Significance testing procedures have been developed to ensure the robustness of results during changes in levels and aggregation (Knudsen, 1987). Getis spatial statistics are used to detect any effects of the MAUP on a set of socio-economic variables (Amrhein, Reynolds, 1996). Various methods are used which specifically address the scale effect: fractal analysis and geo-statistical methods such as kriging, or variograms (Tate and Atkinson, 2001), GWR (Geographically Weighted Regression) to account for spatial heterogeneity (Fotheringham and al., 2000), or even a method that reduces the scale effect to a minimum by searching for strong internal homogeneity (Holt, Steel, Tranmer, 1996).

2.2 A 'better' level of observation?

The following reflections depart from the premise that there is a level of observation for each variable that is better than the others. But, what exactly is meant by better? Here again, one can adopt a number of positions, and we will see that, in terms of the socio-demographic data that interest us here, there are different points of view. Firstly, the wide distribution of micro level data (such as census districts) has led many researchers to assume that the most precise data is the best. Because it offers more detail it is therefore more valuable than all the others. Nevertheless, we soon become aware that, for some variables, too fine a grid adds statistical noise that is related to the low number of individuals per grid square and it therefore tends to present a blurred vision of the territories being studied (for a demographic example, see Guilmoto, Oliveau, 2007). Then there is another position, presented in detail below, which involves choosing the level that presents the most readable spatial structures. This ad hoc approach makes it easier to put forward geographical explanations and it takes a largely empirical approach, which also necessarily raises a number of questions.

Beyond this general questioning, another issue arises when one seeks to compare different territories for a specific level of observation. Therefore, as this paper proposes, this may make international comparisons difficult. The right level for one country will not necessarily be the same for several countries.

The existing levels for observing one territory are not necessarily the same for a second territory. It then becomes necessary to suggest equivalents which are not precise and which result in new mechanisms for selecting the 'best' level. Indeed, one could choose a set of grids in order to reduce the measured statistical variability or attempt to obtain a regular grid based on its surface area. The first approach corresponds to an aspatial approach, while the second disregards the statistical dimension. However, we propose an alternative based on measuring the spatial autocorrelation of the studied variables. This takes into account the statistical variability of the variable based on the spatial distribution of the grids.

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2.3 Measuring spatial autocorrelation as an exploratory tool for determining the best analysis levels

The purpose of this article is not to review the methods that allow us to measure spatial autocorrelation. Extensive literature on the subject has been available since the publication of the classic work by Cliff and Ord in 1973. However, we would like to stress that we have based our measurements on Moran's index (Moran's *I*), used in the form suggested by Cliff & Ord (1981). This is the one found in most publications and it is more widely than that published by Moran (1950).

Thus, Moran's I measures the covariation of the values of a point and that of its neighbours by returning the result to the variance of the set of points. The result of Moran's I calculation is easy to interpret as it is interpreted approximately as a classical linear correlation coefficient. It varies from -1 (negative spatial autocorrelation: the values of the variables for individual neighbours are set against the average) and +1 (positive spatial autocorrelation: the neighbours are similar). It should however be noted that Moran's I value can sometimes be greater than 1 or less than -1. Thus it is not strictly restricted limited to -1 and + 1. Zero[2] marks the absence of negative or positive spatial autocorrelation (at least on a global scale).

Moran's index

Insert: Moran's I

$$Moran's\ I\ \frac{\text{cov}}{\text{var}} = \text{let cov} \div \text{var}$$

$$Moran's\ I = \frac{\sum_i \sum_j w_{ij}(z_i - \bar{z})(z_j - \bar{z})}{m} \div \frac{\sum_i (z_i - \bar{z})^2}{n}$$

$$Moran's\ I = \frac{\sum_i \sum_j w_{ij}(z_i - \bar{z})(z_j - \bar{z})}{m} \times \frac{n}{\sum_i (z_i - \bar{z})^2}$$

$$Moran's\ I = \frac{n}{m} \times \frac{\sum_i \sum_j w_{ij}(z_i - \bar{z})(z_j - \bar{z})}{\sum_i (z_i - \bar{z})^2}$$

We are in a field of spatial statistics and the letters "x" and "y" are reserved for the individual coordinates.

z_i = value of the variable at point "i" and mean $\bar{z}$

i = individual

j = neighbours of "i" individuals.

n = total number of individuals in the sample

m = total number of pairs of neighbours

W = weighting matrix, whose elements are, for example, set to "1" for "i, j" neighbours and otherwise "0".

Moran's *I* makes it possible to measure the spatial structure of a socio-demographic phenomenon. In other words, to reveal whether the studied phenomenon reveals a particular distribution in space or not, and to what degree. Highlighting a spatial structure is therefore the starting point for the geographic analysis, which aims to explain it.

By inverting the reasoning, we propose to define the best level of analysis as the one showing the highest level of spatial autocorrelation. One may well consider that the phenomenon is best revealed at the level presenting the most marked spatial structure. Based on this assumption, we examined the spatial structure of density in France on several dates (Oliveau et al. 2013). This produced enough evidence on the levels that are most likely to demonstrate the phenomena in their spatial dimension.

The following results (see Figure 1) show that the most suitable level for studying densities in France, regardless of the period, would be the district level.

Based on these results, we decided to use the spatial autocorrelation measurement as an indicator on the Mediterranean scale to assess the relevance of the grids that are available for different countries.

3. Creating a sub-national grid around the Mediterranean

In this section, we look at different ways of creating a sub-national grid in the Mediterranean, understood here

2 It will be recalled that, in fact, it is not set to 0 but -1/(n-1), which therefore moves very quickly to 0.

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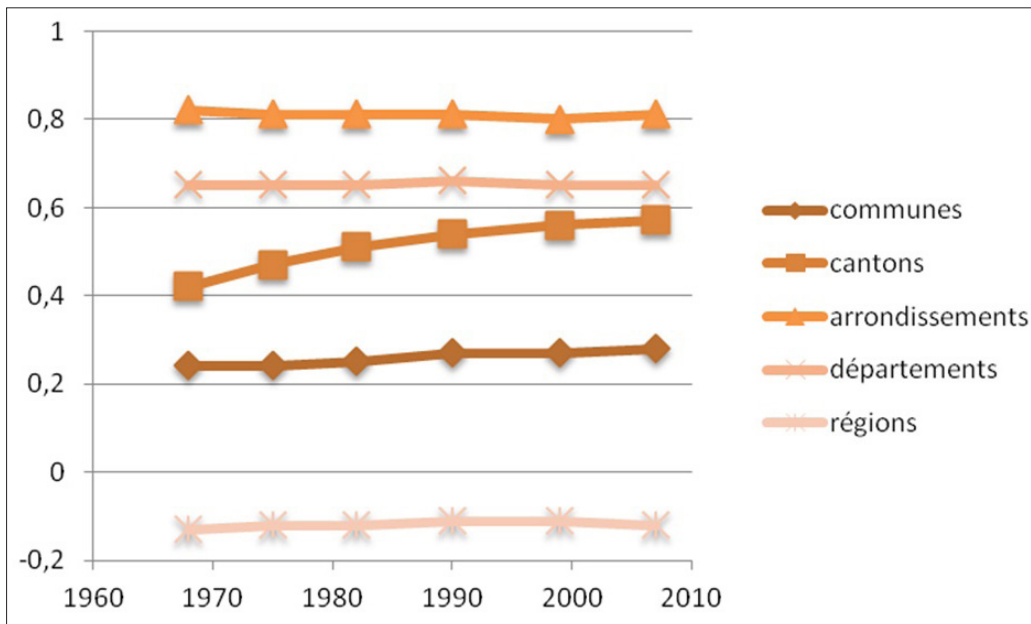
FIGURE 1
Moran's I according to the administrative level in France for population density

AUTHORS: Doignon Y., Oliveau S.

SOURCES: Insee (1968, 1975, 1982, 1990, 1999, 2009)
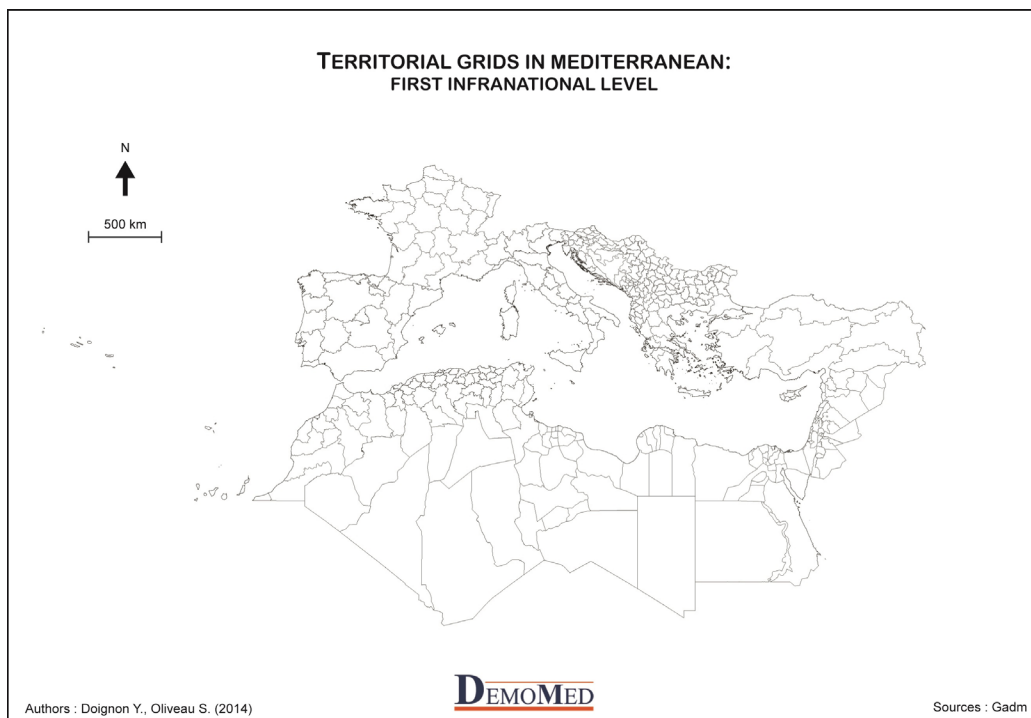
FIGURE 2
Grid of the first administrative level in the Mediterranean

AUTHORS: Doignon Y., Oliveau S.

SOURCES: Gadm v2, 2014

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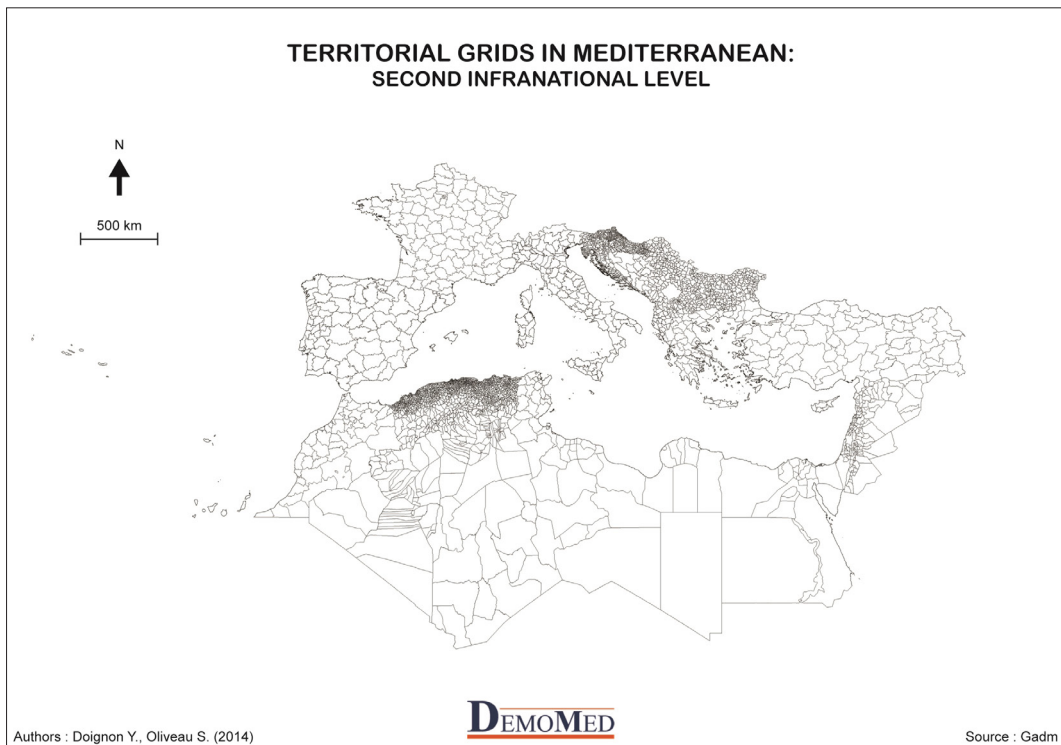
FIGURE 3
Grid of the second administrative level in the Mediterranean

AUTHORS: Doignon Y., Oliveau S.

SOURCES: Gadm v2, 2014

as a group of 27 countries[3]. Specifically, we need to select an administrative level in each country. The number of possible combinations is therefore extremely important. We propose creating several grids and we will assess the relevance of each in Section 3.

Firstly, we present a standard approach that consists of selecting the same administrative level in each country, by analogy to the European NUTS. Secondly, we outline a method for the harmonization of the grids based on a specific criterion.

The data used in this article is detailed in Appendix 1.

3.1 Standard approach: selecting the same administrative level in each country

This approach involves selecting the same administrative level in each country. For example, we select the first administrative level, i.e. the level below the State. In France, Spain, Italy and Morocco this is the region, in Algeria, the *wilaya*, and the *mohafazat* in Egypt.

The assumption underlying this method is the equivalence of the countries' administrative levels based on their ranking. The Italian regions correspond to the Albanian *qark* because this is the first administrative level in each of these countries.

In the case of the Mediterranean, Figures 2 and 3 show the first and the second administrative levels in all the Mediterranean countries, respectively. The extreme heterogeneity of the size of the grids is striking. The Spanish provinces have an average surface area which corresponds to that in Lebanon (see table 5).

This shows us that the hypothesis of the equivalence of the grids according to the order of the administrative levels is not realistic within the context of their international comparability. It is therefore necessary to perform harmonization of the selected grids. Equivalence between the various administrative levels in Mediterranean countries needs to be defined. In order to compare the Italian provinces, which administrative level should

3 Mediterranean refers here to all the following countries: Morocco, Algeria, Tunisia, Libya, Egypt, Lebanon, Israel, Syria, Palestine, Jordan, Turkey, Cyprus, Greece, Albania, Macedonia, Kosovo, Montenegro, Bulgaria, Serbia, Bosnia and Herzegovina, Croatia, Slovenia, Italy, Malta, France, Spain, Portugal.

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one choose in Lebanon or Libya in order to obtain comparable entities? The criteria used to determine the "comparability" of the grids also need to be questioned.

3.2 An alternative approach: harmonizing grids based on a common criterion

Simply adjusting the order of the administrative levels in order to construct a sub-national grid in the Mediterranean is not enough. It is necessary to establish equivalence between the grids in order to select comparable administrative levels in each country. This harmonization needs to put forward a criterion that defines different grids as being equivalent or at least comparable. Two criteria spring to mind: surface area and population. The comparability criterion is very dependent on the research problematic. In geography, we tend to rely heavily on surface area, whereas demographers and sociologists are more likely to use population.

In order to compare grids in different countries, we propose calculating the elements of centrality (mean and median) and dispersion (coefficient of variation) of the surface area and population for each administrative level. Tables 4 and 5 (in the appendices) confirm the extreme heterogeneity previously observed in terms of the surface area of the selected grids (Figures 2 and 3). The first administrative levels are not equivalent in terms of population or surface area. Whereas the Italian regions average 15,000 km² with an average of 2,990,000 inhabitants, Serbian *okrug* average 3,100 km² with 300,000 inhabitants. In this case, we should, for example, select those Italian provinces with an average size of 2,800 km² and an average of 566,000 inhabitants. This means that, in order to obtain broadly comparable grids for these two countries, one would need to select the second administrative level in Italy and the first level in Serbia.

These tables highlight another important aspect, namely the internal heterogeneity of some grids. The dispersion indicator can be very pronounced in some countries. This is the case of the Algerian *wilayas*, for example, which have a surface area coefficient of variation of 2.39. This situation is understandable given that the Saharan *wilayas* are large whereas those on the Mediterranean coast are small. In this case, the mean does not really make sense and greater importance should be attached to the median. The researcher should use both indicators to assess a grid.

These grids showing marked heterogeneity on a national scale are problematic in that would be more accurate to create a grid consistent with the administrative levels. One solution would be to homogenize the grid by spatial aggregation and disaggregation of its units (as was done for India and China, Guilmoto and Oliveau, 2007). This method significantly increases the internal homogeneity of the grids. However, the units obtained by this process can be meaningless in situations where the initial administrative divisions have a precise, known legal meaning (Dumolard, 1998). This can prove particularly problematic when it comes to interpreting results.

Another solution is to accommodate the existing heterogeneity in favour of a higher interpretative potential when the analysis is complete. On the other hand, it should be remembered that the grids in some countries are heterogeneous and this should be taken into account when interpreting the data.

This type of summary table facilitates the creation of a similar grid based on a specific criterion. It is also possible to harmonize using a subsequently defined value. In this paper, we construct two grids of this type: the first is harmonized to 500,000 inhabitants, a second, harmonized to around 25,000 km². In each country, we retain the administrative level that is closest to these values in terms of the mean and median of the grids. The administrative levels for our two grids are recorded in Table 1. For some countries, all sub-national grids have a population or a surface area that is very different to the criterion value. Accordingly, the administrative level selected is the state level.

In concrete terms, the grids created here are not perfectly harmonized because not all the administrative levels selected have the expected population or surface area. For the Mediterranean, this is due to the impossibility of comparing grids in some countries, regardless of the administrative level under consideration. We illustrate this aspect with two examples. If we attempt to compare Algeria and Spain in terms of population, we can see in Table 4 that the first Spanish level is very densely populated compared with the first Alge-

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rian level. On the other hand, the second level corresponds much better: a median of almost 550,000 compared with 565,000 in Algeria. Thus, these two grids are comparable in terms of population.

However, if we want to compare Algeria and Portugal in terms of surface area, Appendix 1 shows that it is impossible to find a suitable match. Whereas the first Algerian level is 3.5 times larger than the Portuguese one, the second level is twice as small as the Portuguese second level and almost nine times the size of the first level. In concrete terms, we are unable to find comparable grids in Algeria and Portugal. Having discarded the idea of modifying the administrative grid, we need to reach a compromise, bearing in mind that the comparison between these two countries is not optimal.

Finally, in this article we have four levels of grid available for the Mediterranean: a grid with the first administrative level in all countries; a grid with the second administrative level in all countries for which population data is available (if it is not, the higher level is selected); a grid harmonized to 500,000 inhabitants and finally a grid harmonized to 25,000 km². Table 1 summarizes the administrative levels selected for each of these four grids.

As we have shown, by maintaining a simple approach based on two administrative levels, it is not difficult to produce four different pan-Mediterranean grids. Making a selection will not be easy, however. In addition, bearing in mind what we recalled about the MAUP, it is highly probable that these grids will not have the same properties or the same influence on the results of the analysis. *A priori*, some will be more suited to cartographic representation and others to statistical analysis. We propose to test this hypothesis in the last section.

4. What is the impact of the grids on analysis?

The spatial and statistical variability of these four grids will be studied. We will examine which grid is more homogeneous in terms of its population and surface area. We will also introduce the population density variable in order to observe the effect of each grid on a third variable. For each grid, we calculate the mean, the coefficient of variation and the median of the following variables: population, surface area, and population density. Tables 2 and 3 highlight the large statistical variability of the results according to the grids.

For the population criterion, Grid 2 is the one that shows the greatest dispersion. This is not surprising as a larger scale reveals the higher heterogeneity. The most homogeneous grids are clearly the two harmonized grids. However, these are not situated at the same level of observation. Grid 3 has a median of 360,000 inhabitants while that in Grid 4 is 760,000 inhabitants. In other words, Grid 4 is twice as aggregated as Grid 3. Both are statistically more homogenous but do not present the same level of observation.

For the surface area criterion, Grid 2 remains the one with the most dispersion. Note that this grid does not relate to all second administrative levels in the country, because we selected only the levels for which population data was available. To examine what the dispersal of the area with the second administrative level in all countries would have been, we created Grid 5. In this case, the spread is even greater... Logically, the grid that is harmonized according to surface area (Grid 4) is the one that presents the lowest dispersion.

In the case of population density, the harmonized grids (nos. 3 and 4) are statistically less dispersed. It should be noted that Grid 4 has a median that is comparable to Grid 2, but with a much lower dispersion. The average and median population density is stronger in Grids 1 and 3. One can still observe differences of almost 90 inhabitants/km² depending on the grid, which is an important aspect when one is attempting to examine population distribution.

These figures show that investing in a harmonized grid, even an imperfect one, is provides better value than economizing by using a grid made up of a set of grids that are equivalent from an administrative point of view. Nevertheless, one should remember that a grid which is suitable for statistical analysis is not necessarily the most suitable grid for cartographic representation.

Figures 4, 5, 6 and 7 represent the population density for each of the previously selected grids (except Grid 5, for which we do not have all the data). They are a very good example of the scale effect of the MAUP: depending on the map selected, the interpretations of popula-

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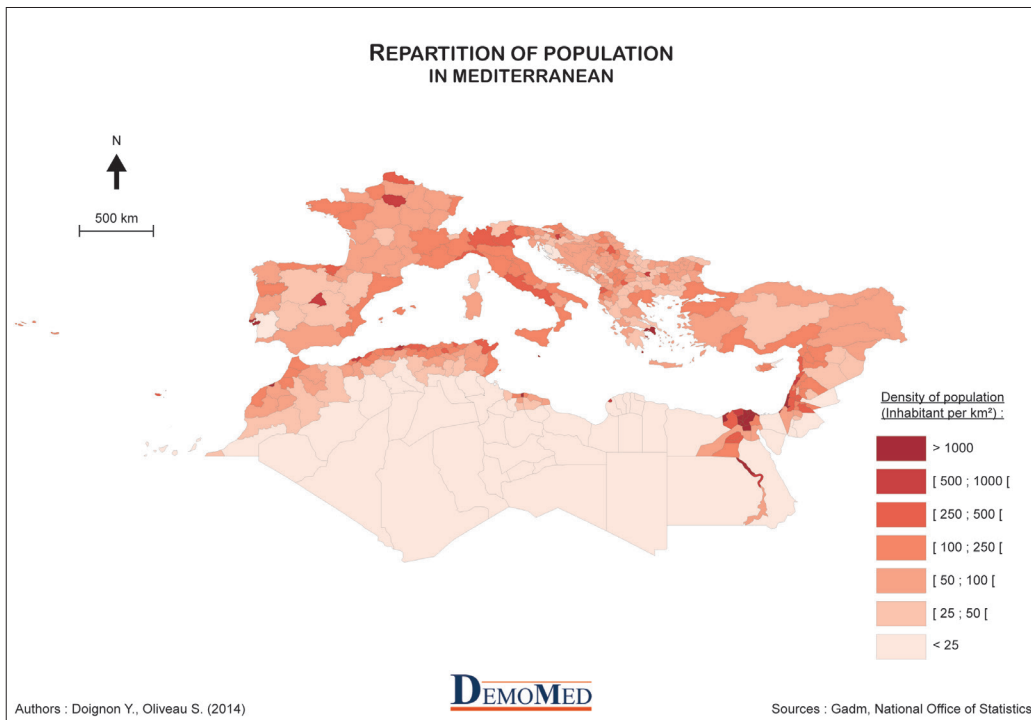
FIGURE 4
Population density with Grid 1

AUTHORS: Doignon Y., Oliveau S.

SOURCES: Gadm v2, most recent estimates from National Office of statistics
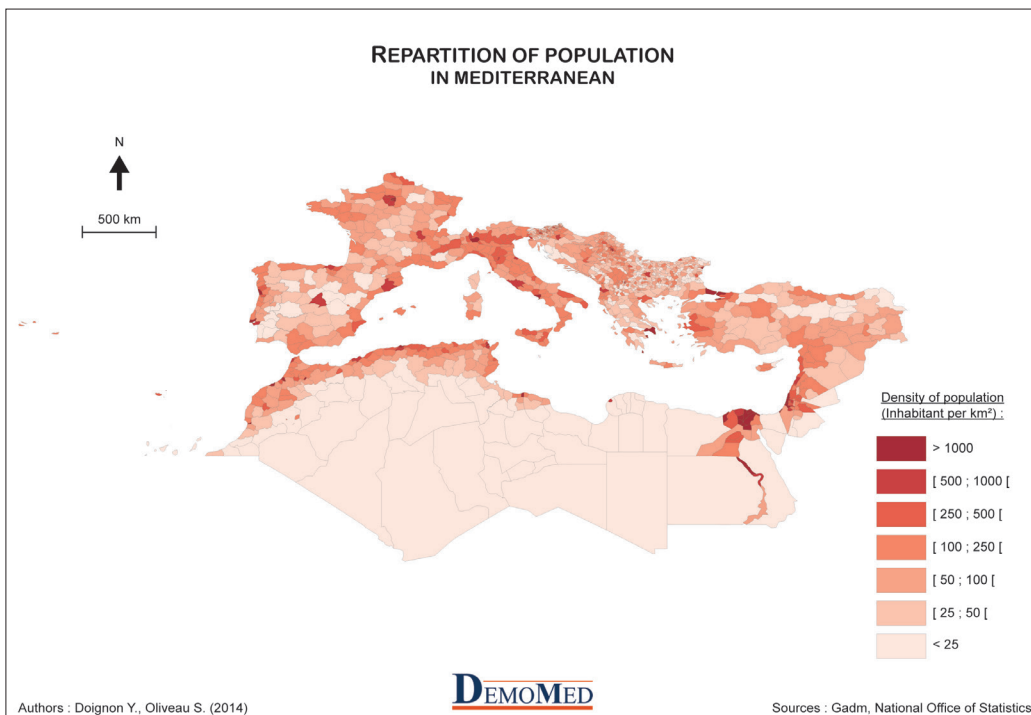
FIGURE 5
Population density with Grid 2

AUTHORS: Doignon Y., Oliveau S.

SOURCES: Gadm v2, most recent estimates from National Office of statistics

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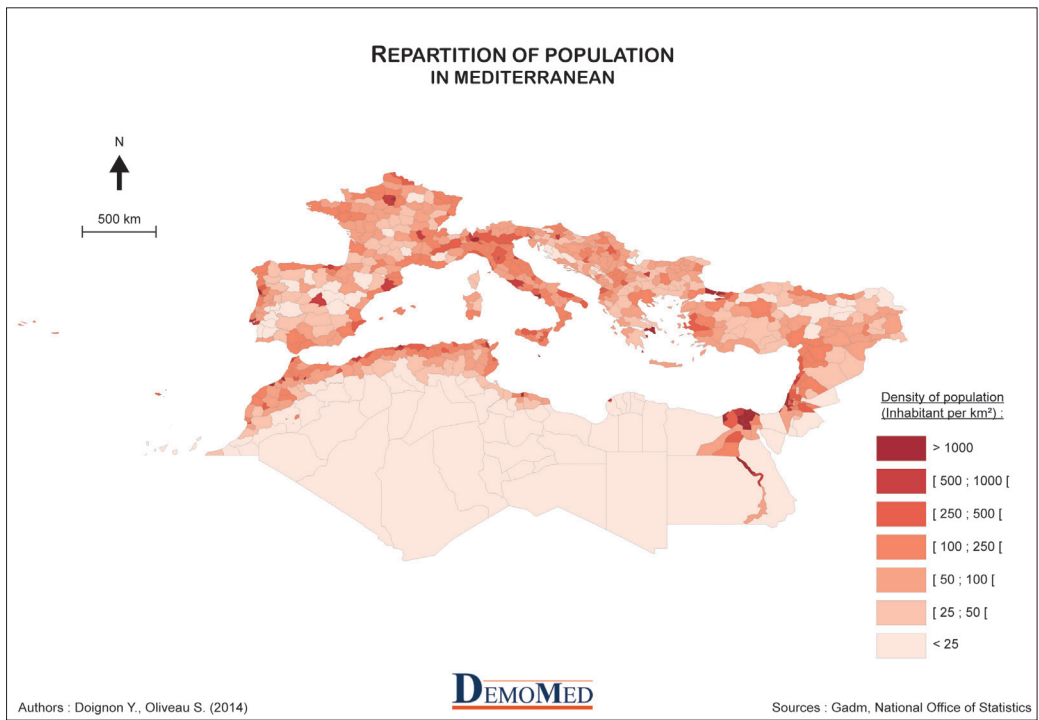
FIGURE 6
Population density with Grid 3

AUTHORS: Doignon Y., Oliveau S.

SOURCES: Gadm v2, most recent estimates from National Office of statistics
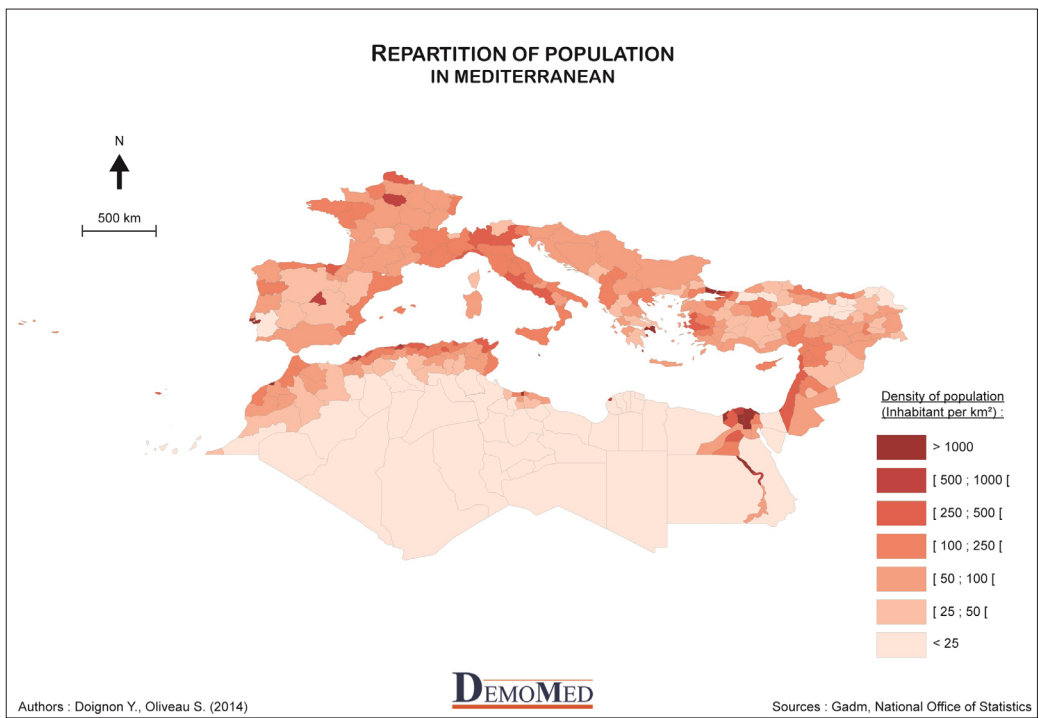
FIGURE 7
Population density with Grid 4

AUTHORS: Doignon Y., Oliveau S.

SOURCES: Gadm v2, most recent estimates from National Office of statistics

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tion distribution vary. In the case of Grid 1, the highest population densities are noted in the regional unit comprising the capitals of European countries (Portugal, Spain, France, Italy, Slovenia and Greece). Furthermore, very few low densities are noted on the north shore. In the case of the south shore, people are located near water: rivers (such as the Nile), coastal areas in North Africa and the Near East. Grid 2 shows more nuanced distribution. In Europe, the diagonal of French empty space and the Spanish desert are revealed, as well as low density areas in Turkey. Several urban centres can be discerned in Morocco. The mapping changes on the south shore in Grid 1 are somewhat limited because, in several countries (Algeria, Libya, Egypt, Syria, Israel and Jordan) we have been obliged to retain the first administrative level due to lack of data. Therefore the observations are the same for both grids. The extreme dispersion previously observed in terms of the size of units in Grid 2 is easily observed on account of the mapping. In the Balkans, for example, the grids are much more detailed in terms of surface area than in southern Europe or the Maghreb where the grids look much more homogeneous.

Grid no. 3 appears more homogeneous. However, the grids in some regions are less detailed than other grids. Population distribution in the Balkans for example, is made up of higher concentrations in Albania and Kosovo and in Athens, Greece. In the rest of the Balkans, the densities are relatively homogeneous.

Grid 4, meanwhile, offers a compromise between Grids 1 and 2. We can observe the concentrations of population in metropolitan areas and near water (rivers and coastline), but also in unpopulated areas (France, Spain, Turkey, and the Sahara).

The grid used to study population distribution in the Mediterranean directly affects the results of cartographic analysis and map interpretation. A map will be even more readable and interpretable if it contains pronounced spatial structures. The distribution of males in the Maghreb is easily to interpret due to the pronounced spatial structure, i.e. the coast/Sahara contrast. The Balkans present a contrasting example in the case of Grid 2, in which few spatial structures seem to emerge.

However, it is more interesting to measure these spatial structures instead of trying to read them off a choropleth map. To do this, we will build on Moran's I using a neighbourhood by adjacency matrix (see Table 3 and Figure 8). The results are less marked than the previous ones, but it is still possible to determine trends. Both harmonized grids present the highest spatial autocorrelation, which is consistent with the observations made earlier. For order 1 adjacency, Moran's I of Grid 3 reaches 0.56. This result is even more significant as it covers more than 750 units. In addition, the correlogram (see Figure 8) shows that Grid 3 has a sharper spatial structure than the other grids, regardless of the order of adjacency retained. The second harmonized
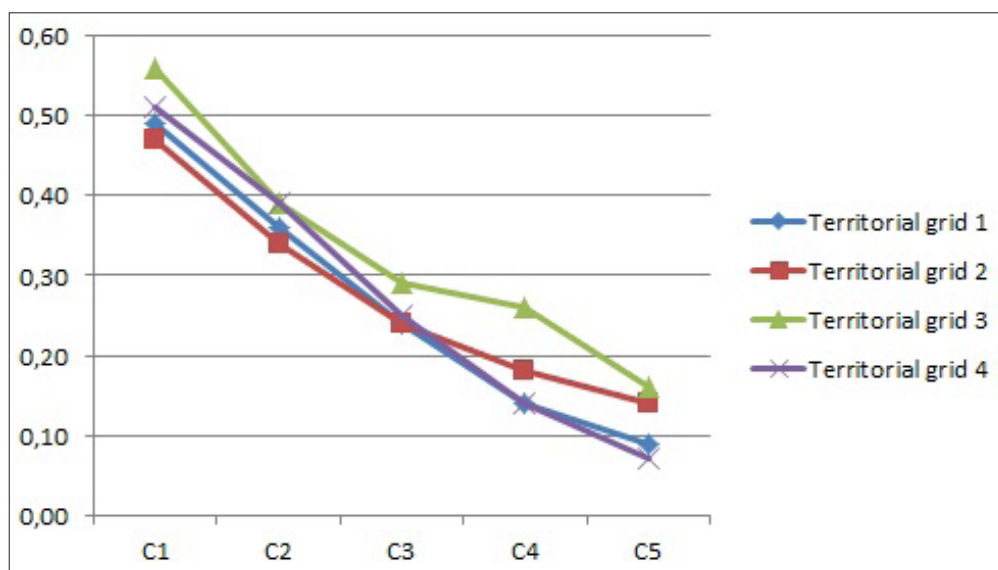
FIGURE 8
Correlogram indices of population density (order of adjacency) Moran

AUTHORS: Doignon Y., Oliveau S.

SOURCES: Gadm v2, most recent estimates from National Office of statistics

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grid (Grid 4), also shows a stronger spatial autocorrelation than the grids that are not harmonized, but this is less significant than in Grid 3, even though it is more aggregated and therefore more smoothed.

Without being able to demonstrate this, one can consider that the lower Moran's I in Grid 2 is partly the result of the heterogeneity of the grids used (where level 2 is not generally available).

These few succinct procedures show how important the choice of grid is for a geographical study. Indeed, for a similar study area and variable, the grids do not have the same degree of spatial structure. This is a not insignificant aspect when you consider the potential impact on cartographic interpretation (visual over-evaluation of specific spaces, “omitting” areas that are too small). Unsurprisingly, the harmonized grids (and in preference, No. 3) appear to be the most appropriate ones.

5. Conclusion

Although it is frequently overlooked, the choice of grid in statistical or cartographic studies is essential. It will inevitably have an effect on the results. Research into the MAUP has unsuccessfully attempted to minimize its effects. More recently, researchers have begun to accept the pitfalls inherent in spatial data and to propose solutions aimed at taking into account the MAUP as it is not possible to dispense with it. Therefore, the aim is not to disregard the MAUP, but to be aware of its existence in order to seek solutions that limit it or at least integrate it into considerations.

However, an awareness of the bias represented by space in statistical analysis does not justify a failure to question the grid prior to studying it. This reflex questioning of the source should be developed, regardless of whether one is working on one or several countries. However, it becomes even more important when the study focuses on a set of countries at the subnational level. The number of possible grids is then multiplied and the solutions quickly gain in complexity as each country has several different administrative levels. The potential number of combinations for creating an international grid at the subnational level can very soon prove to be huge.

Nevertheless, there are solutions based, in the first instance, on an expert approach - by initially eliminating the levels that are unsatisfactory and, secondly, selecting the most relevant levels based on statistical and spatial homogeneity.

In this article, we have attempted to highlight the need for studies on grids and also to propose realistic solutions based on geo-statistical methods which are easily accessible nowadays. We have used data constructed for the Mediterranean region in order to highlight the extent to which the grid influences the spatial and statistical variability of results. This study has also showed that, when developing rigorous analyses from a statistical and spatial point of view, grids that are ‘harmonized’ to population or surface area are more effective than grids constructed according to the administrative level.

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Tables

TABLE 1 – Composition of territorial grids used in this article

	Subnational level				
	Territorial grid 1	**Territorial grid 2**	**Territorial grid 3**	**Territorial grid 4**	**Territorial grid 5**
Albania	1	2	1	0	2
Algeria	1	1	1	1	2
Bosnia and Herzegovina	1	2	2	1	2
Bulgaria	1	2	1	0	2
Cyprus	1	1	0	0	1
Croatia	1	1	1	0	2
Egypt	1	1	1	1	1
Spain	1	2	2	1	2
France	1	2	2	1	2
Greece	1	2	1	1	2
Israel	1	1	1	0	1
Italy	1	2	2	1	2
Jordan	1	1	1	0	2
Kosovo	1	1	1	0	2
Lebanon	1	1	1	0	2
Libya	1	1	1	1	1
Macedonia	1	2	1	0	2
Malta	0	0	0	0	0
Morocco	1	2	2	1	2
Montenegro	1	1	0	0	1
Palestine	1	2	2	0	2
Portugal	1	2	2	1	2
Serbia	1	2	1	0	2
Slovenia	1	2	1	0	2
Syria	1	1	1	1	2
Tunisia	1	2	2	1	2
Turkey	1	2	2	2	2

AUTHORS: Doignon Y., Oliveau S. SOURCES: Gadm v2, National Central Statistics Office

Territorial grid 1: First sub-national level in each country
Territorial grid 2: Second subnational level if there are population data, or upper level
Territorial grid 3: Territorial grids harmonized to 500,000 inhabitants
Territorial grid 4: Territorial grids harmonized to 25,000 km²
Territorial grid 5: Second subnational level in each country

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TABLE 2 – Statistic variability

	Population			Area			Population Density		
	Mean	**Coefficient of Variation**	**Median**	**Mean**	**Coefficient of Variation**	**Median**	**Mean**	**Coefficient of Variation**	**Median**
Territorial grid 1	1,194,614	1.72	367,455	21,568	2.72	4308	329	4.34	82
Territorial grid 2	320,233	2.25	66,376	5,856	5.19	764.87	297	4.72	64
Territorial grid 3	626,191	1.46	361,242	11,404	3.66	4234	381	4.02	86
Territorial grid 4	1,521,754	1.24	760,785	27,621	2.31	10,850	293	3.89	79
Territorial grid 5	X	X	X	2,405	6.07	187	X	X	X

AUTHORS: Doignon Y., Oliveau S. SOURCES: Gadm v2, National Central Statistics Office

TABLE 3 – Spatial variability measured by Moran's I, by order of contiguity

	Moran's I (by order of contiguity)				
	Order 1	**Order 2**	**Order 3**	**Order 4**	**Order 5**
Territorial Grid 1	0.49	0.36	0.24	0.14	0.09
Territorial Grid 2	0.47	0.34	0.24	0.18	0.14
Territorial Grid 3	0.56	0.39	0.29	0.26	0.16
Territorial Grid 4	0.51	0.39	0.25	0.14	0.07

AUTHORS: Doignon Y., Oliveau S. SOURCES: Gadm v2, National Central Statistics Office

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TABLE 4 – Summary table based on the population criterion

Country	Level 0	Subnational level 1				Subnational level 2			
		Mean	Standard Deviation	Coefficient of Variation	Median	Mean	Standard Deviation	Coefficient of Variation	Median
Albania	3,194,417	266,201	192,204.50	0.72	228,875	89,965	124,649	1.40	48,794
Algeria	29,100,863	606,267	407,915.28	0.67	565,513				
Bosnia and Herzegovina	3,866,530	1,933,265	558,853.36	0.29	X	233,107	173,213	0.74	239,920
Bulgaria	7,563,710	270,132	232,264.15	0.86	198,267	28,695	85,301	2.97	12,267
Cyprus	840,407	140,705	99,141.00	0.70	143,192				
Croatia	4,437,460	211,307	162,453.40	0.77	162,045				
Egypt	68,046,408	2,617,169	1,903,836.50	0.73	2,810,945				
Spain	52,921,889	2,725,559	2,526,866	0.93	1,733,015	860,561	1,148,999	1.34	549,925
France	62,482,931	2,854,041	2,472,616.10	0.87	2,129,309	650,769	494,209	0.76	531,955
Greece	11,260,402	866,184	1,065,867.65	1.23	592,017	220,792	575,323	2.61	113,285
Israel	7,255,300	1,036,471	535,363.46	0.52	1,084,200				
Italy	59,836,894	2,991,844	2,509,262.24	0.84	1,840,867	566,907	647,875	1.14	376,393
Jordan	5,103,639	425,303	551,714.15	1.30	178,894				
Kosovo	1,956,189	391,237	175,467.76	0.45	376,085				
Lebanon	3,755,033	625,838	464,818.42	0.74	436,203				
Libya	6,097,500	190,546	189,484.26	0.99	131,690				
Macedonia	2,048,619	256,077	147,161.52	0.57	201,082	21,276	25,435	1.20	11,928
Malta	416,000								
Morocco	29,607,002	1,973,800	909,417.11	0.46	1,908,905	547,405	463,832	0.85	484,895
Montenegro	628,631	29,934	36,746.13	1.23	18,482				
Palestine	3,767,126	1,883,563	660,466.02	0.35	1,883,563	235,445	149,354	0.63	231,077
Portugal	10,225,836	1,460,833	1,387,922.95	0.95	750,800	354,578	405,062	1.14	248,667
Serbia	7,498,001	299,920	284,715.00	0.95	227,435	46,571	48,052	1.03	27,513
Slovenia	1,990,272	165,856	131,909.12	0.80	122,453	9943	21,722	2.18	4953
Syria	17,920,844	1,280,060	968,152.88	0.76	1 131 587				
Tunisia	9,910,872	1,651,813	1,117,030.58	0.68	1,283,936	412,953	214,180	0.52	403,892
Turkey	67,817,797	10,263,142	5,279,253.12	0.51	9,000,000	941,913	1,606,058	1.71	546,503

AUTHORS: Doignon Y., Oliveau S. SOURCES: National Central Office Statistics

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TABLE 5 – Summary table based on the surface area criterion

Country	Level 0	Subnational level 1				Subnational level 2				Subnational level 3			
		Mean	Standard Deviation	Coefficient of Variation	Median	Mean	Standard Deviation	Coefficient of Variation	Median	Mean	Standard Deviation	Coefficient of Variation	Median
Albania	28,754	2392	867.92	0.36	2507.78	774	451.78	0.58	809.54	75	54.88	0.72	63.45
Algeria	2,311,292	48,158	114,926.97	2.39	5965.60	1536	8798.88	5.73	121.51				
Bosnia and Herzegovina	50,965	25,483	2573.61	0.10	25,483.49	2831	2192.91541	0.77	2547.00	358	277.72	0.77	291.60
Bulgaria	112,033	4001	1528.52	0.38	3643.17	425	254.43	0.60	371.22				
Cyprus	9269	1544	735.07	0.48	1370.21								
Croatia	56,953	2711	1425.40	0.53	2370.73	101	113.33	1.11	66.95				
Egypt	985,513	37,904	95,282.48	2.51	5160.08								
Spain	505,519	28,083	30,347.28	1.08	10,947.74	9912	5011.16	0.51	9837.47	1373	996.70	0.73	1219.83
France	548,080	24,912	11,434.65	0.46	25,881.15	5709	1939.35	0.34	5929.14	1566	916.00	0.58	1515.25
Greece	132,376	9454	5768.33	0.61	9216.68	2545	1288.09	0.51	2468.70				
Israel	22,420	3202	5104.85	1.59	1240.20								
Italy	300,225	1, 011	7,384.26	0.49	14,340.05	2729	1586.79	0.58	2454.46	37	49.48	1.34	21.67
Jordan	89,190	7432	10,751.68	1.45	2987.30	1715	5331.71	3.11	385.35				
Kosovo	10,887	2180	613.89	0.28	2067.04	363	166.71	0.46	343.86				
Lebanon	10,423	1737	1450.12	0.83	1569.00	400	419.41	1.05	289.14				
Libya	1,618,639	68,020	119,188.12	1.75	13,880.17								
Macedonia	24,791	3098	1005.63	0.32	2974.39	288	232,24	0.81	228.17				
Malta	325												
Morocco	413,764	27,585	24,083.36	0.87	16,554.41	7662	9,081.15	1.19	5245.00	1037	2284.80	2.20	46.00
Montenegro	13,313	655	485.77	0.74	492.40								
Palestine	6225	3112	3,916.66	1.26	3112.37	389	319.31	0.82	317.48				
Portugal	92,140	13,162	13,494.69	1.03	4929.74	3071	2193.50	0.71	2405.53				
Serbia	77,761	3110	974.00	0.31	3046.81	482	284.39	0.59	420.41				
Slovenia	19,932	1660	781.15	0.47	1782.42	103	94.26	0.91	71.16				
Syria	186,521	13,321	13,471.87	1.01	8360.94	3108	5677.66	1.83	1278.96				
Tunisia	154,910	25,817	16,940.39	0.66	19,174.68	6454	8336.76	1.29	4 102.18	578	1950.85	3.38	293.26
Turkey	779,915	111,463	41,692.59	0.37	91,562.15	10,686	6462.88	0.60	8814.78	840	696.67	0.83	649.38

AUTHORS: Doignon Y., Oliveau S. SOURCES: GADM v2

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Appendix 1
Explanatory insert on the data used in article

Insert on the data

In order to form a grid that is harmonized according to the criteria of population or surface area, the ideal is to have this data for all the administrative levels of the group of countries. The data availability makes it difficult to obtain all of this data. We are focussing exclusively on administrative grids because the data is produced within this legal framework.
For surface areas, we used GADM v2 maps. This data provider makes available a certain amount of administrative content for all the countries in the world. Obviously, the depth of the administrative levels is uneven depending on the country. All levels are available in France, unlike Egypt where only the *mohafazats* level is available. Using a GIS, we have calculated the area of each unit in each available administrative level.
For population, we collected data from the most recent census or annual results from the central statistics offices of each country. For Syria, the current environment meant we were obliged to collect population data from the Gazetteer.de website. For all countries, we did not go below the second administrative level because we have insufficient data at the lower levels for a number of countries.
Table 6 summarizes the administrative levels for which we have surface area and/or population data. This article will only consider those levels for which both population and surface area data is available. Not to have all data for all levels within a country is a disadvantage, but it is possible to demonstrate that, even for only these administrative levels, the grid has a noteworthy effect on the analysis results.

TABLE 6 – Data available for this article

	Administrative Level			
	0	1	2	3
Albania	[red]	[red]	[red]	[green]
Algeria	[red]	[red]	[green]	
Bosnia and Herzegovina	[red]	[red]	[red]	[green]
Bulgaria	[red]	[red]	[red]	
Cyprus	[red]	[red]		
Croatia	[red]	[red]	[green]	
Egypt	[red]	[red]		
Spain	[red]	[red]	[red]	[green]
France	[red]	[red]	[red]	[green]
Greece	[red]	[red]	[red]	
Israel	[red]	[red]		
Italy	[red]	[red]	[red]	[green]
Jordan	[red]	[red]	[green]	
Kosovo	[red]	[red]	[green]	
Lebanon	[red]	[red]	[green]	
Libya	[red]	[red]		
Macedonia	[red]	[red]	[red]	
Malta	[red]	[red]		
Morocco	[red]	[red]	[red]	[green]
Montenegro	[red]	[red]		
Palestine	[red]	[red]	[red]	
Portugal	[red]	[red]	[red]	
Serbia	[red]	[red]	[red]	
Slovenia	[red]	[red]	[red]	
Syria	[red]	[red]	[green]	
Tunisia	[red]	[red]	[red]	[green]
Turkey	[red]	[red]	[red]	[green]

Population and area data available for this administrative level
Surface data only available for this administrative level

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Costa Blanca: evoluzione urbana di una regione mediterranea attraverso dati GIS

Costa Blanca: Urban Evolution of a Mediterranean Region through GIS Data

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Riassunto

Il contributo analizza la migrazione internazionale dei pensionati dell'Europa del nord in Spagna e la sua influenza sull'espansione del relativo sprawl urbano. I temi chiave indagati includono l'espansione dello sprawl urbano durante la bolla immobiliare spagnola e la relazione tra lo stile di vita dei migranti e lo sviluppo dello sprawl urbano. Il contributo considera le motivazioni del trasferimento in Spagna che sono prevalentemente collegate con il clima e lo stile di vita. Esplora anche i vantaggi e gli svantaggi di queste migrazioni di massa e gli impatti ambientali e paesaggistici sul Mediterraneo spagnolo. Per visualizzare meglio questa migrazione internazionale si sono create mappe GIS da banche dati del progetto CORINE LAND COVER o da censimenti ufficiali spagnoli. Per la creazione delle cartografie si è utilizzato ArcGIS di ESRI.

Parole chiave

Stile di vita e migrazione, ***sprawl*** urbano, bolla immobiliare, Mediterraneo spagnolo, dati GIS

Abstract

This paper investigates the international retirement migration from elderly northern Europeans into Spain and its influence on expansion of urban sprawl there. Key themes analyzed in this paper include the urban sprawl expansion during the Spanish housing bubble, and the link between lifestyle migrants and urban sprawl development. This paper considers the reasons for moving to Spain, which are chiefly related with the climate and lifestyle. It also explores the benefits and drawbacks of these en masse lifestyle migration and the environmental and landscape impacts on Mediterranean Spain. In order to visualize better this international migration we have created some GIS maps from a GIS project (CORINE Land Cover) dataset or from the official Spanish Census data. The map design program used to create the maps in this paper has been ArcGIS by ESRI

Keywords

Lifestyle migration, Urban sprawl, Housing bubble, Mediterranean Spain, GIS data

1. Introduction

The migration of Northern European elderly people into Mediterranean Spain is one of the most significant flows of International Retirement Migration (IRM) over the entire world during the first decade of the twentieth century. This paper explores the effects of such vast migration on the huge expansion of urban sprawl on Mediterranean Spain, and discusses both the economic benefits and the environmental drawbacks on this territory. This development was favoured by the Spanish government, promoted by public authorities and large construction companies, with foreign capital involved, and mostly driven by retired lifestyle migrants.

Among the more than 5 million expatriates migrated into Spain during the last two decades, around 20% did so from higher GDP *per capita* countries than Spain's. Most of these latter migrated into Spain mainly with the expectation of achieving a better way of life through residential mobility. This kind of mobility – called *lifestyle migration* (Oliver, 2007; Benson and O'Reilly, 2009) – has recently experienced a significant worldwide expansion (Janoschka & Haas, 2013). We can find the roots of lifestyle migration in Spain in the mass tourism boom initiated in the 1960's. The remarkable growth in both wealth and life expectancy that took place in Northern Europe from the 1960's on resulted in a swell in the numbers of Northern European elderly who could afford to holiday abroad, preferably in the Mediterranean region, after the end of their working lives (Russell *et al.,* 1998). From the 1990's on many of the usual tourists in sunny Spain – especially senior citizens – decided to take up permanent residence in the Mediterranean region and became *lifestyle* migrants (Rodríguez *et al.*, 1998, 2004, 2005; King *et al.*, 2000; O'Reilly, 2000, 2007; Williams *et al.*, 2000; Casado, 2006; Gustafson, 2009; Huete, 2009; Mazón *et al.*, 2009).

In the Spanish Mediterranean coastal areas where senior migrants have settled, all the land-use planning that has been done in the last decades has aimed to serve real estate and tourist interests (Vera and Ivars 2003; Mazón 2006; Huete & Mantecón, 2011). This was particularly so during the global economic expansion of the late 20th century and the early 21st century, when elderly migrants (over 55) arrived in Spain *en masse* in order to stay: their numbers went from 60,000 in 1991 to almost 450,000 in 2012.This IRM was triggered, as regards Spain, by a combination of causes such as low-cost airlines, relatively low housing prices and cost of living, and global technological improvement.

If we analyze the use of artificial land during the last twenty years in Spain, we can see that urban land uses experienced a strong rise in this period, chiefly due to the Spanish housing bubble (1997-2007) (Burriel, 2008 and 2009; Gaja, 2008; Romero, 2010; Rullan, 2011); and also that among urban land uses, it was *urban sprawl* that grew the most in those years. Local developers contributed to the expansion of sprawling development patterns in the Spanish Mediterranean area by constructing thousands of single-family homes that were largely bought by Northern European migrants. It must be pointed out that urban sprawl – a kind of development pattern studied by Gillham (2002), Richardson & Chang Hee (2004), Hogan & Ojima (2008) or Brody (2013) – had been scarcely present in Spain, or in the whole Southern Europe region, before the economic expansion of the late 20th century and the early 21st century (Muñoz, 2003; Pumain, 2004; Roca *et al.*, 2004).

The aim of this paper is thus, first, to examine the massive retirement lifestyle migration from Northern Europeans into Mediterranean Spain; second, to explore and discuss the effects of such migration on the huge expansion of urban sprawl in there; and third, to analyze the consequences of the urban sprawling in the Spanish Mediterranean coast, with all the short-term benefits for local economies and all the long-term drawbacks for the territory.

2. Data and Methods

In order to study the numbers of population, construction and IRM in the Spanish Mediterranean region, we have analyzed data from the INE (*Instituto Nacional de Estadística*) Spanish Census. So as to distinguish lifestyle migrants living in Spain from those who are not, we have taken into account their age (55 and over) and country of origin: whether immigrants came from higher GDP per capita countries than Spain's (and so could be regarded as *lifestyle* migrants) or from lower GDP *per capita* countries than Spain's (and in this case, they

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could be seen as labour migrants). We assume that not all the over-55-migrants coming from richer countries than Spain are lifestyle migrants, but most studies agree that the number of cases deviating from this mentioned distribution is not significant.

We have taken data from two GIS projects to study the urban sprawl in the Spanish Mediterranean area. The first is CORINE Land Cover (CLC), started in 1985 as an initiative of the European Commission with the aim of gathering environmental data about the European Union and incorporated in the European Environment Agency (EEA) since 1994. The EEA is the institution responsible for providing information on Europe's environmental and territorial policies – to achieve this aim it uses CLC. Its first version dates from 1990, and it was updated in 2000 and 2006. Although the first version of CLC is from 1990, in the maps where CLC information is used (e.g. fig. 8 & 9), we specified that the urban sprawl refers to 1987, because orthophotos used in Spain for creating CLC90 come from 1987 and not from 1990. The CLC nomenclature consists of 44 land uses, 11 of which are labelled *artificial uses*. Among these 11 artificial uses can be found the so-called *Discontinuous urban fabric*, which is defined as a use comprising *residential areas around the edge of urban district centres, and certain urban districts in rural areas* – this is, therefore, the CLC's land use which best describes the sprawling development pattern, and we have employed it to draw our maps of urban sprawl evolution in Spain. A second GIS project on land use evolution that we have taken into account, even though only for statistical purposes, is SIOSE (*Sistema de Información de Ocupación del Suelo en España* or 'Spain's Land Cover Information System'), a project promoted in 2005 by the Spanish *Instituto Geográfico Nacional* (IGN, 2006, Membrado, 2011) and updated in 2009 and 2011. SIOSE's nomenclature is formed by simple and composed land uses. One of the composed land uses is *mixed urban*, which in turn is divided into *casco* (old city), *ensanche* (new city), and *discontinuo* (urban sprawl). In order to distinguish urban sprawl areas from compact cities, we have taken the class *discontinuous mixed urban* as the equivalent of urban sprawl.

The map design program used to create the maps in this paper has been ArcGIS by ESRI (Environmental Systems Research Institute). In order to create our maps of Spain we have used provincial-level data, which are more disaggregated than those at a regional level, and less disaggregated, but easier to read, than those at a municipal level. To create our maps of Costa Blanca we have used as a reference the *comarca* level, which is smaller area than a province but bigger than a municipality (and rather similar to a county). Throughout this paper, we repeatedly use the place name *Mediterranean Spain*, meaning Spain's sunniest, warmest, and most touristic areas. For statistical purposes, under the name *Mediterranean Spain* we include all the Mediterranean coastal provinces (including the Balearic Islands) and also the Atlantic coastal provinces (i.e., Atlantic Andalusia and the Canary Islands), which have a Mediterranean climate too. Whenever we do not have province-based data but only region-based data, we use the term *Spain's Mediterranean regions*, which, for statistical purposes, refers to all the regions by the Mediterranean Sea (i.e., Catalonia, València, the Balearic Islands, Murcia and Andalusia) and also to the Canary Islands.

3. Background

3.1 The Spanish Housing Bubble

Between 1997 and 2007, economic growth in Spain was mainly based on the construction sector, a fact which was particularly striking all along the Mediterranean coast. This housing boom can be explained by two main factors. The first is that Spain, as a member of the Euro zone since its creation in 1999, enjoyed the benefits of being part of a currency regarded as strong and safe (Romero, 2010: 24). It was thus easy for Spanish banks and companies to get credit from abroad. The second is the approval in 1998 of a new Land Law which established that any non-protected piece of land could be built on (Rullan, 2011: 182). The conjunction of both factors led to considerable investment of private capital (both Spanish and foreign) in the housing sector, offering quick, substantial returns. Town councils began to promote urban expansion so as to use it as a source of revenue (via taxes). The lack of a proper regulatory framework allowed non-public developers to build as much as they wanted. Neither national nor regional au-

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thorities were able, or willing, to control this development promoted by municipalities and private interests, or to attenuate its impact on environmental sustainability (Burriel, 2008).

This development process was reinforced by cheap credit, thanks to the low interest rates that banks charged on loans to buy a house. This, in turn, led to more people buying houses as opposed to renting them. Thanks to the construction fever, unemployment in Spain went from 21% in 1997 to 8% in 2006. The rising employment increased many families' disposable income, and also attracted many immigrants, whose number went from 1% of the whole population living in Spain in 1995 to 12.2% in 2010. This increase of the immigrant population also implied that even more people now wanted to buy a house in Spain.

Because of land speculation, the average housing price multiplied by three between 1997 and 2007. That led to a growing housing bubble that eventually burst in the 2007 global financial crisis (figure 1). The credit lines were cut, causing the collapse of the construction-dependent economy. Since then, housing price has fallen in Spain by a third and housing construction has descended to levels of the early 1960's.

3.2 Expansion of urban sprawl. Characteristics of this development pattern

Urban sprawl is a pattern of low-density settlement which has been the prevailing urban development pattern in Spain for the last 20 years. According to CLC data, in the period 1987-2006 urban or other developed land uses increased significantly all over Spain, especially in Mediterranean Spain, where 134,280 new hectares were developed. Among these developed land uses, it was *urban sprawl* that grew the most (46,406 new hectares) (fig. 2). If we take into account only a 10-km-deep coastal strip, developed land uses increased by 83,496 hectares, and *urban sprawl* alone grew by 35,653 (+68%). According to CLC, in 2006 4.2% of land along a 10-km-deep coastal strip in Mediterranean Spain was occupied by urban sprawl, a percentage that reached 40% in some resort towns.

Urban sprawl was developed in the USA particularly after the Second World War, when large suburban residential areas were created there. The spread of urban sprawl to Europe began first in the northern countries (by the 1960's), then it reached France (where suburbanization multiplied fivefold between 1969 and 1999)

FIGURE 1 – Spain: land (thousands of sq. m) to be built on (1990-2012)
SOURCE: Ministerio de Fomento (2013)

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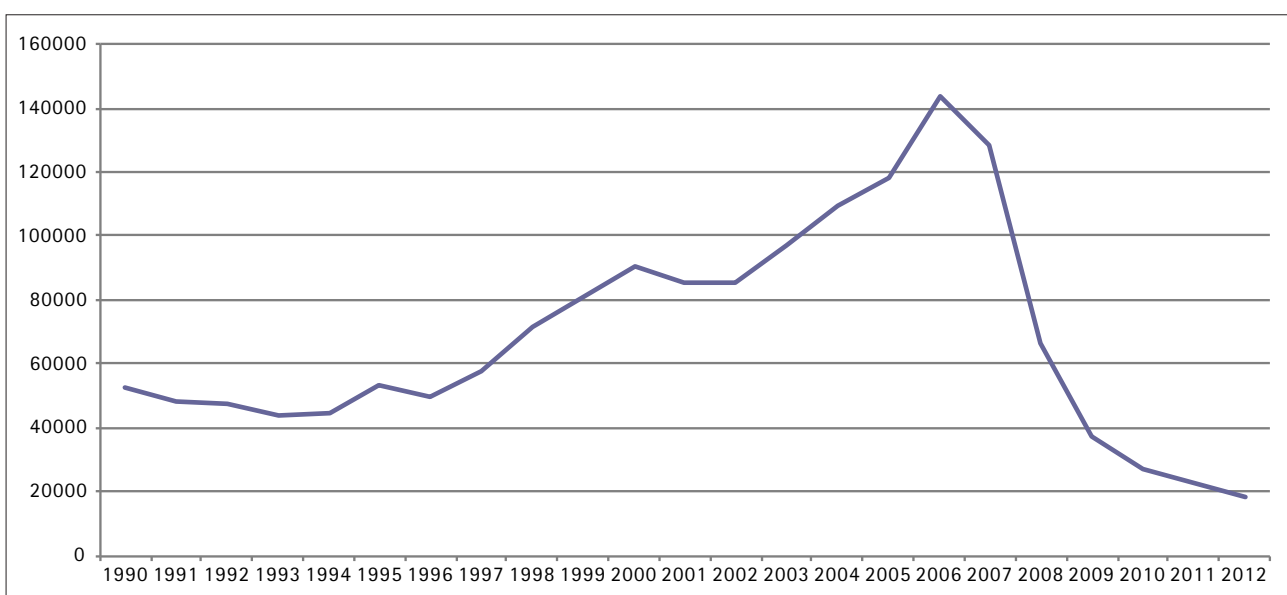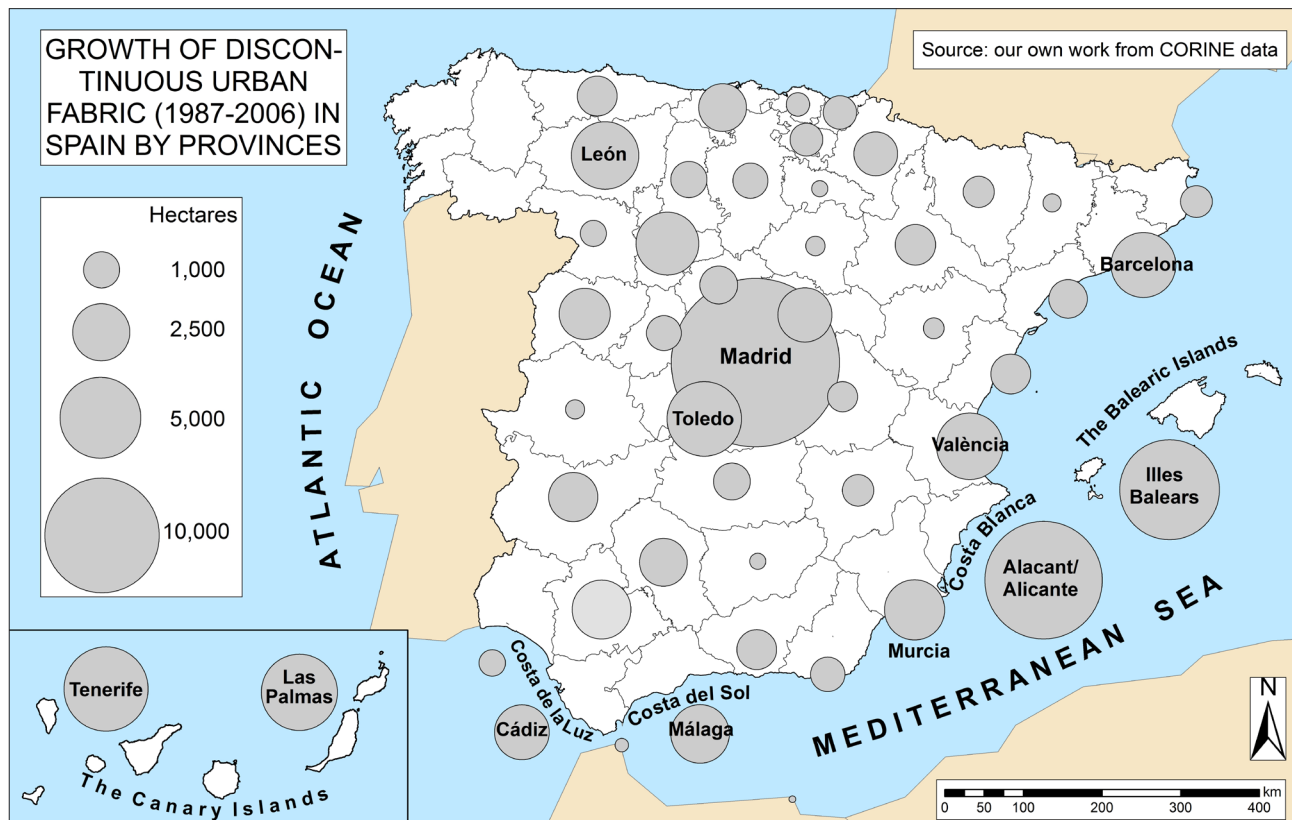
FIGURE 2 – Spain: urban sprawl growth by provinces (1987-2006)
SOURCE: CLC

(Pumain, 2004: 137), and finally it affected Spain, Italy and other southern countries. Before the remarkable recent urban sprawl development, the Mediterranean coastal regions had traditionally been a paradigm of high-density cities, urban complexity and social diversity (Muñoz, 2003: 381; Roca *et al.*: 2004).

Although there is not a universally accepted definition of *urban sprawl*, there are several common characteristics that can help us describe it, according to Brody (2013). First, the most frequently noted feature of sprawl is that low-density, single family dwellings consume large amounts of previously natural or farm land. Second, the development of homogeneous sprawl neighbourhoods lacking a mixture of land uses (residential, commercial, amenities...) forces residents to rely on automobiles even for short distances. During the 2000's, car use grew faster in Europe than in the USA, a fact which can be linked to the growth, despite some European pro-compact city policies, of urban sprawl in the old continent. Nowadays 'there is more convergence than divergence between the United States and Western Europe' as regards suburbanization (Richardson and Chang Hee, 2004: 7). Third, sprawl housing grows outward from more compact urban cores. Approximately 80 percent of the land for new housing in the US during 1994-1997 can be found outside compact cities (Heimlich & Anderson, 2001); according to CORINE, during 1987-2006 73% of land for new housing in Spain was for sprawl outside urban cores. Fourth, development is dispersed, which favours the development of land situated further out in the countryside. This leapfrogging growth creates a chaotic development pattern consuming large amounts of natural and farm lands. Fifth, sprawl residences are often placed along the roads extending outward from urban centres, which creates a *ribbon* development that increases traffic jams.

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And sixth, urban sprawl often encroaches on natural and agricultural lands and thus tends to blur the division between urban and rural areas.

Those who support urban sprawl believe that living in a suburban area increases contact with nature and reduces traffic congestion and air pollution. Furthermore, they argue that suburban houses are cheaper than those closer to the city centre and that, when asked, most people prefer to live away from the compact city (Gillham, 2002: 72). Opponents of urban sprawl regard it as undesirable since it devours a huge amount of valuable land resources (including farmland and wetlands) and devastates landscapes. Moreover, it consumes unsustainable amounts of energy and water. Its dependence on the use of private vehicles causes not only air pollution but also traffic congestion, obesity and stress for drivers. Besides, it destroys community life and segregates people according to their status (*Ibid.*).

Among the causes which attract people from compact cities into suburban areas we can name the cost of housing: those who want to buy a large house can find less expensive options in suburban areas. Choosing to live in a sprawling residential area, however, is not only linked to the cost of housing but also to some new values (environmental awareness, global communication technology) as well as to the expansion of globalized patterns of production and consumption (Hogan & Ojima 2008: 205).

4. Connection between Lifestyle Migrants and Urban Sprawl in Spain

4.1 Lifestyle migrants in Mediterranean Spain

Thanks to the temporary wealth created by the Spanish housing bubble, Spain attracted over 5 million immigrants, a fact which made Spain's ratio of immigrants to the whole of the country's population (12.2% in 2010) one of Europe's highest. Due to the current economic crisis, nowadays Spain is not only losing a part of those immigrants, but many young and competent Spaniards have also been forced to resort to emigration.

We must distinguish between two main types of immigrants in Spain. First, there are those who come from a country poorer (i.e., with a lower GDP per capita) than Spain. These are the *labour* migrants; and most expatriates (80%) living in Spain belong to this type. They mainly come from Eastern Europe, Southern America and Northern Africa, and they came into Spain looking for a better future, expecting to find work (if they find one it is as an employee) and better living conditions (figure 3). Second, there is a noteworthy minority of immigrants (20%) whose origin are countries richer (with a higher GDP per capita) than Spain. Typically these come from the United Kingdom, Germany, the Benelux or Scandinavia. For the most part, they decided to settle all along the Mediterranean coast, in search not only of sunny, dry weather (Membrado, 2012: 139), but also of a different lifestyle. Many of them are retirees, who rely on their pensions and savings to make a living. Those who are not retirees are usually self-employed, often providing services for same-nationality, retired migrants (figure 4). We will call them *lifestyle* migrants, since they are not *residential tourists*, who are usually identified with second-home users. They are people who live all the year or most of the year in the Mediterranean coast, most of them owning a property and registered there. They do not consider themselves as tourists anymore, although most of them were tourists in Spain before they decided to move here. They are people trying to redefine their daily life in a place different from the one where they used to live and work (Huete & Mantecón, 2012: 161). The complexity of this new type of mobility led Benson & O'Reilly (2009: 609) to use the notion of *lifestyle migrants*, i.e. "relatively affluent individuals of all ages, moving either part-time or full-time to places that, for various reasons, signify, for the migrant, a better quality of life".

Although the goal of every immigrant is finding a better life, the weight of economic factors is greater among migrants coming from countries with a lower GDP than their host country (i.e., labour migrants) than it is among migrants from countries with a richer GDP than their host country (i.e., lifestyle migrants), because the latter are supposed to have a purchasing power comparatively higher than labour migrants, which allows them to enjoy more freedom of movement in the host country. Lifestyle migrants are attracted more by the idea of "achieving a better quality of life through a

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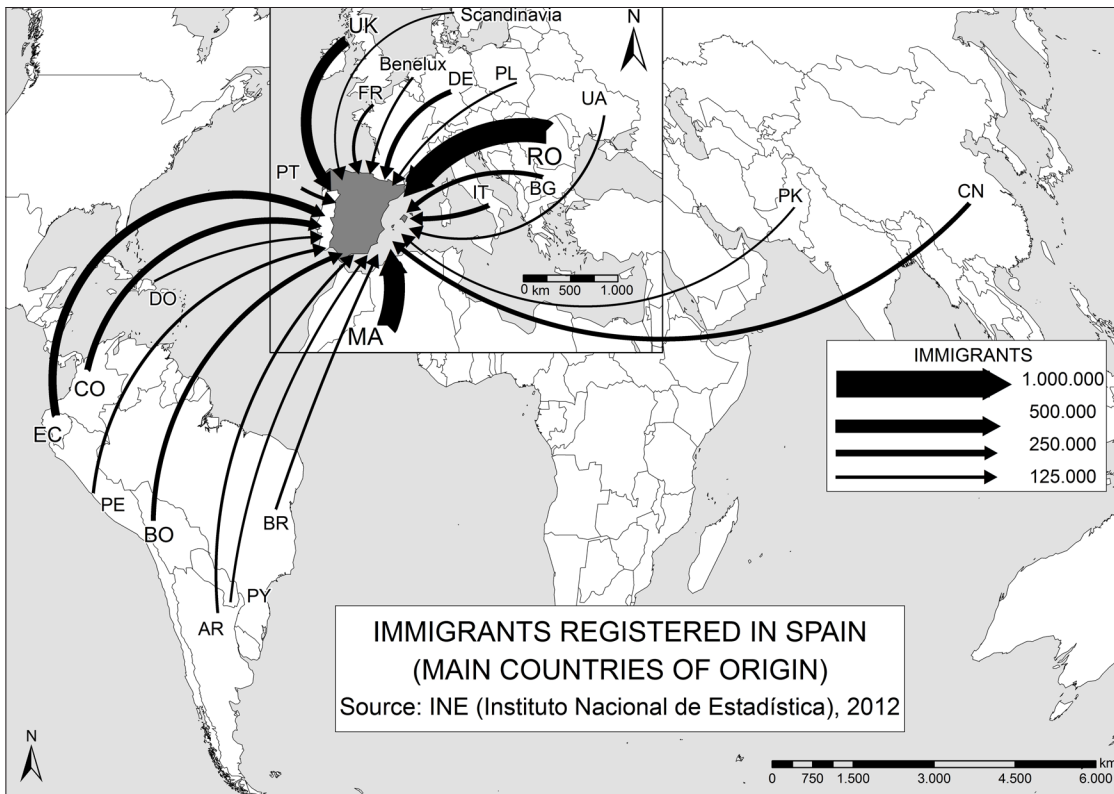


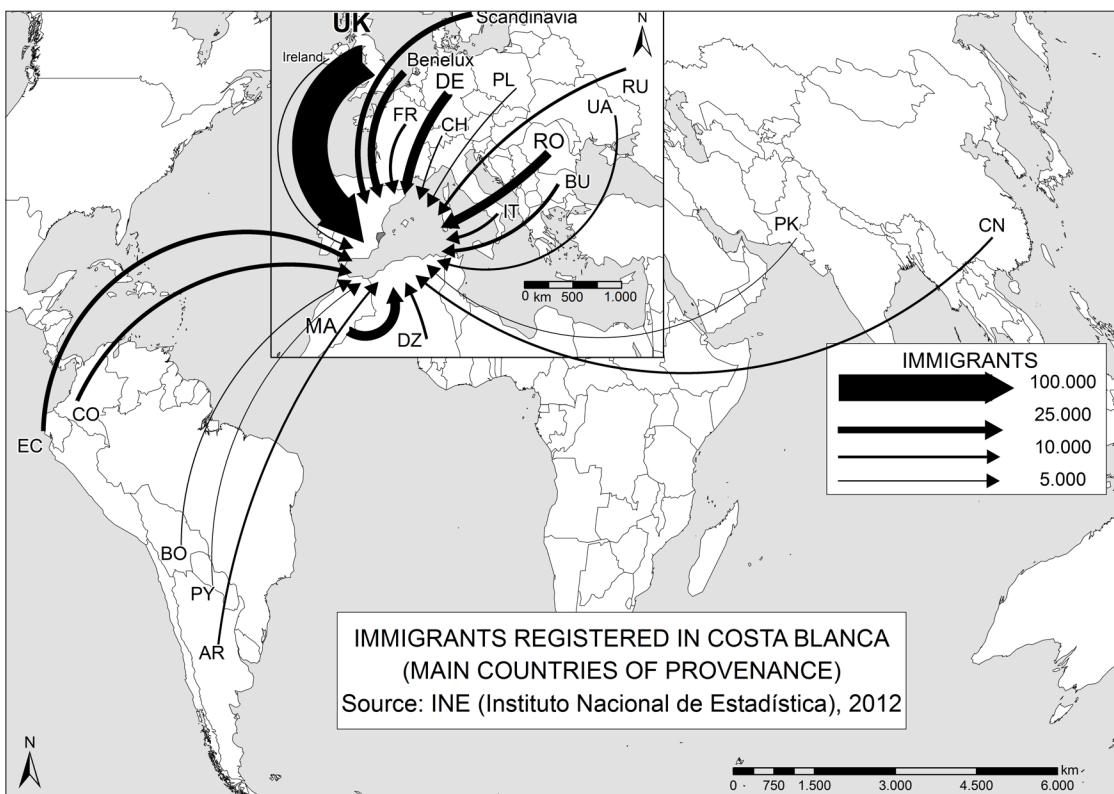
FIGURE 3 Spain: main countries of origin of registered immigrants (2012)

SOURCE: INE (2013)

FIGURE 4 Costa Blanca: main countries of origin of registered immigrants (2012)

SOURCE: INE (2013)

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change in lifestyle" (Torkington, 2012:72-73) than they are by purely economic causes, although it must be admitted that economic causes, such as the difference in the cost of living and housing costs between the country of origin and the host country, are also a factor behind lifestyle migrants' decision to move (Huete *et al.*, 2013:333).

Usually, in order to distinguish among *labour* and *lifestyle* migrants, researchers have tended to identify lifestyle migrants with those belonging to certain nationalities (i.e., countries whose GDP per capita is higher than that of the host country). This has led to the conclusion that all Northern Europeans expatriates in Spain are lifestyle migrants. However, Huete *et al.* (2013: 334) consider that the concept of lifestyle migrant in the strict sense should refer only to those migrants whose daily life in Spain is linked to leisure experiences – basically, the retirees. Indeed, retirees are the most clearly identified group of lifestyle migrants, since they can enjoy their free time rather than doing a job. As far as Spain's senior migrants are concerned, it must be noted that almost half of the expatriates coming from countries with a higher GDP per capita than Spain's are 55 and over, and that 95% of these senior migrants have settled in Mediterranean Spain (see figure 5).

In this paper we will deal mainly with retired lifestyle migrants, who, as we have explained, can be regarded as the only lifestyle migrants in the strict sense (see fig. 5 and 6). Retired lifestyle migrants choose to live in the Mediterranean Spain for various reasons, among them the housing cost, the cost of living, the climate and the sea, but also what they regard as the Mediterranean lifestyle – a lifestyle that implies a better quality of life, and a healthier life, thanks to its slower pace and its outdoor activities. It is also important to take into account the role of the Spanish and foreign promoters, and also of the Spanish political authorities, in supporting mass tourism and attracting the attention of potential buyers abroad to the Spanish coastal areas. Spanish and foreign promoters are also responsible for the concentration of expatriates of the same nationality in certain areas. In order to achieve optimization of resources and costs, promoters tried to sell each development in just one country, thus creating colonies of people from the same country. These settlements by nationality were particularly sought by the elderly, who found it safer to move abroad if they could live among people from their own country (Huete, 2005).

Therefore, as those colonies of retired lifestyle migrants settled, they formed social groups with a common language and culture. Each group of expatriates grows and creates huge colonies of Englishmen, Germans, Dutchmen, Norwegians, etc., and each colony becomes a piece in a multicultural mosaic (Piqueras, 2011: 202-203). As these colonies of lifestyle migrants become numerically more important, their influence is bigger. They participate in Spain's social and political life, at least at a municipal level. Many lifestyle migrants have been included in Spanish parties' lists, and even some local parties have been founded by lifestyle migrants in dozens of coastal towns and villages. Foreign councilors are now a common part of the political stage in coastal Mediterranean Spain (Janoschka & Durán, 2013: 61 & 66).

Whereas *labour* migrants can be found all over Spain, their number depending on the population and the GDP of each province, *lifestyle* migrants are mainly concentrated in Mediterranean Spain. Costa Blanca (the tourist name for the province of Alacant/Alicante) is the area with the highest percentage of lifestyle migrants on the total local immigrant population (35% of all immigrants living in Costa Blanca are lifestyle migrants). If we observe the origin of immigrants (of all kinds) living in Costa Blanca (figure 4), and compare it with the origin of immigrants living in the whole of Spain (figure 3), we notice significant differences. Whereas in Costa Blanca the biggest group of expatriates come from the UK, in Spain as a whole they come mostly from Romania, Morocco and South America.

4.2 Europe's most popular place for lifestyle migrants to live in

Spain is, by far, the Mediterranean country with the highest number of lifestyle migrants. The number of registered inhabitants coming from European countries richer than Spain to this country in 2012 was around 1,125,000 (INE, 2013). If we compare this number with the amount of lifestyle migrants living in other Mediterranean-climate European countries, we can see that

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Italy (150,000) (ISTAT, 2013; data from 2010), Portugal (60,000) (SEF, 2013, data from 2010) and Greece (50,000) (EL.STAT, 2013; data from 2001) lag far behind Spain.

As regards retired lifestyle migrants, 60,000 of them lived in Spain in 1991, whereas in 2012 their number was almost 450,000 (figure 5). Despite the economic crisis (which started in 2007), this number did not cease to grow until 2012 – that year, according to INE data, the number of retired lifestyle migrants living in Spain fell (by 8,880) for the first time since official records began to list immigration data. In figure 6 we can see the geographic distribution of lifestyle migrants 55 and over. 95 of them live in Mediterranean Spain. The areas where they prefer to settle are Costa Blanca (35,5% of all retired lifestyle migrants in Spain live there), Costa del Sol (17,1), the Canary Islands (13,5), the Catalan Coast (7,1%), the Balearic Islands (6,6), Mediterranean Andalusia without Costa del Sol (5), Murcia (4,6), and the Valencian coast excluding Costa Blanca (3,4) (figure 6).

As far as the nationality of lifestyle migrants is concerned, in figure 6 we have distinguished five provenances according to the immigrants' languages: Britons, plus a small Irish colony; Germans, including the small colony of Austrians and the sizable Swiss colony, most of which consists of German speakers; people from the Benelux (Dutchmen, Belgians and Luxembourgers), who for the most part speak Dutch; Scandinavians, where the Swedish and Norwegian colonies are considerable; and speakers of Romance languages (Frenchmen and Italians).

Lifestyle migrants over 55 from France and Italy (60,742; 14% of all lifestyle migrants over that age in Spain) constitute a majority in the entire Catalan coast, due to the geographical proximity of their countries of origin to Catalonia. As for Scandinavians (36,726; 8.4% of all lifestyle migrants over 55 living in Spain), they are concentrated in tourist resorts such as Costa Blanca and Costa del Sol. People from the Benelux (37,844; 8.6% of all lifestyle migrants over 55 living in Spain) are also predominantly concentrated in Costa Blanca, and, in a lesser way, in Costa del Sol. German speakers (95.426; 21.8% of all lifestyle migrants over 55 living in

FIGURE 5 – Spain: evolution of lifestyle migrants (1991-2013)
SOURCE: INE (2013)

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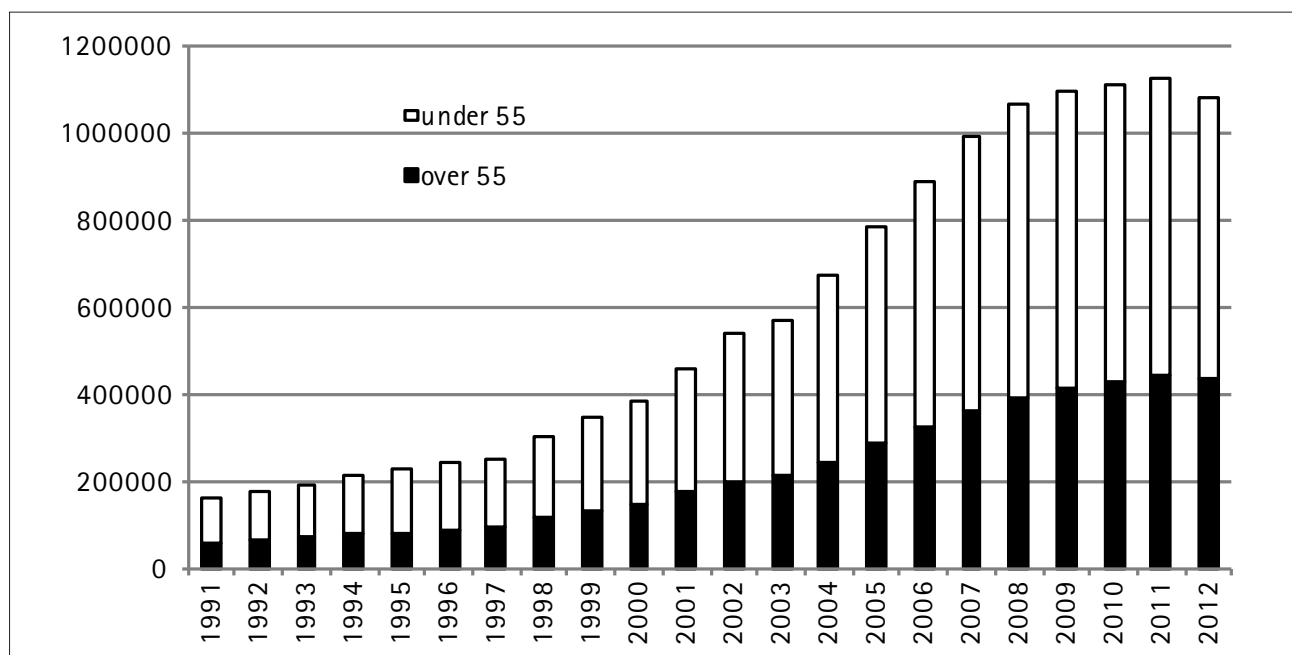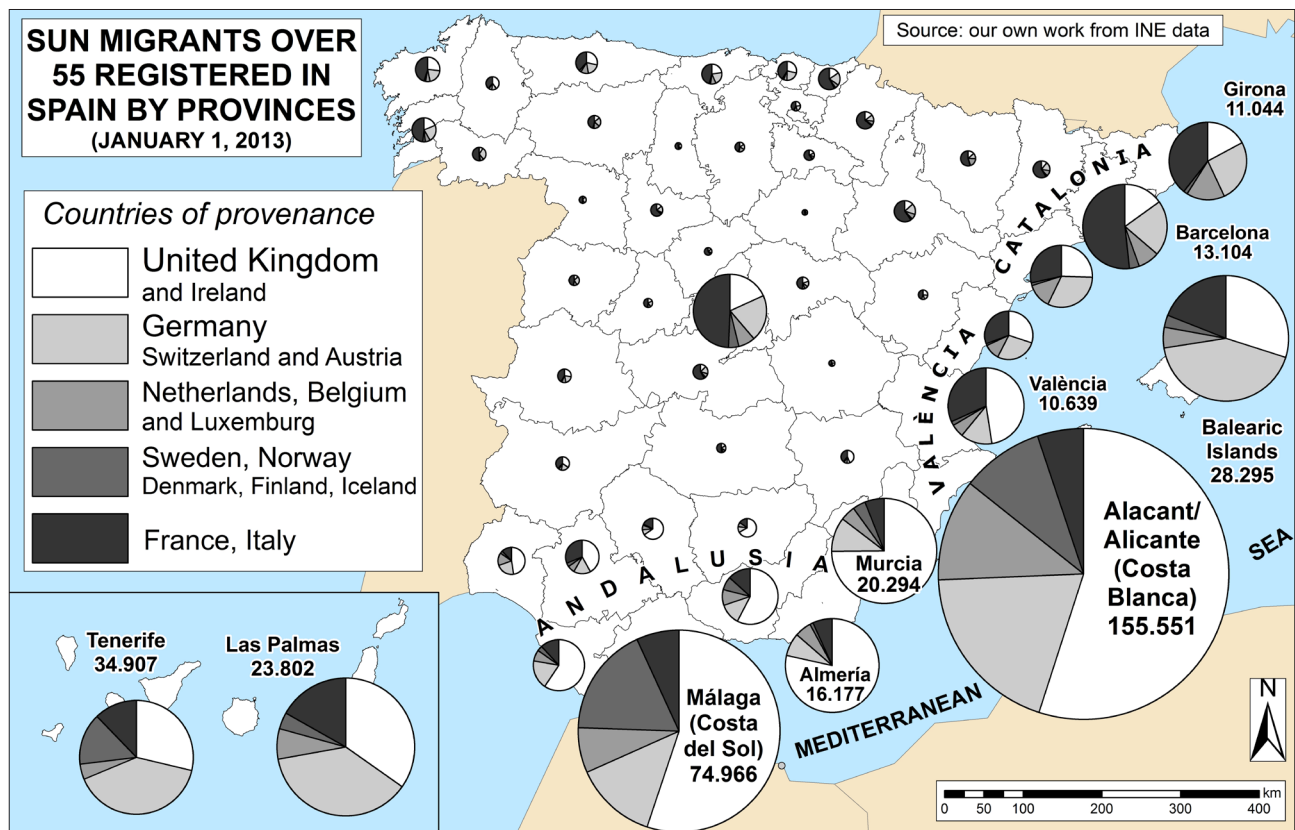
FIGURE 6 – Spain: registered lifestyle migrants by nationality and by province in 2012
SOURCE: INE (2013)

Spain), prefer Costa Blanca as well, but there are also big colonies of them in the Canary and the Balearic islands – in both archipelagos German speakers constitute the biggest colony of retired lifestyle migrants. Almost half of the retired lifestyle migrants living in Spain (47.3%) come from Great Britain (with Ireland) (207,274); these people have a preference for Costa Blanca and, in a lesser way, for Costa del Sol; they constitute the biggest colony in the entire southern and eastern Spanish coast, excluding Catalonia and the islands (fig. 6).

4.3. The Contribution of Lifestyle Migrants to Urban Sprawl

When they lived in their countries of origin, most lifestyle migrants now residing in Spain did so in single-family houses, i.e. under a model of urban development that could be characterized as urban sprawl. Apart from the new lifestyle, the better qualities of life or the 3,000 sun hours per year (1,500 in their home countries), lifestyle migrants were attracted to the Spanish Mediterranean area because of the price of single-family houses there. The cost of such a home was relatively low in the Spanish Mediterranean region, even after the price rise during the Spanish housing bubble. Therefore, a growing number of single-family houses have been built in the Spanish Mediterranean coast in recent years thanks to the solvent demand for them by an increasing amount of retired lifestyle migrants, a fact which has contributed to a huge urban sprawl development in that region.

Thus, with the approval of local authorities, real estate developers promoted and constructed thousands of single-family (detached or attached) houses in the Spanish Mediterranean coast. With this development

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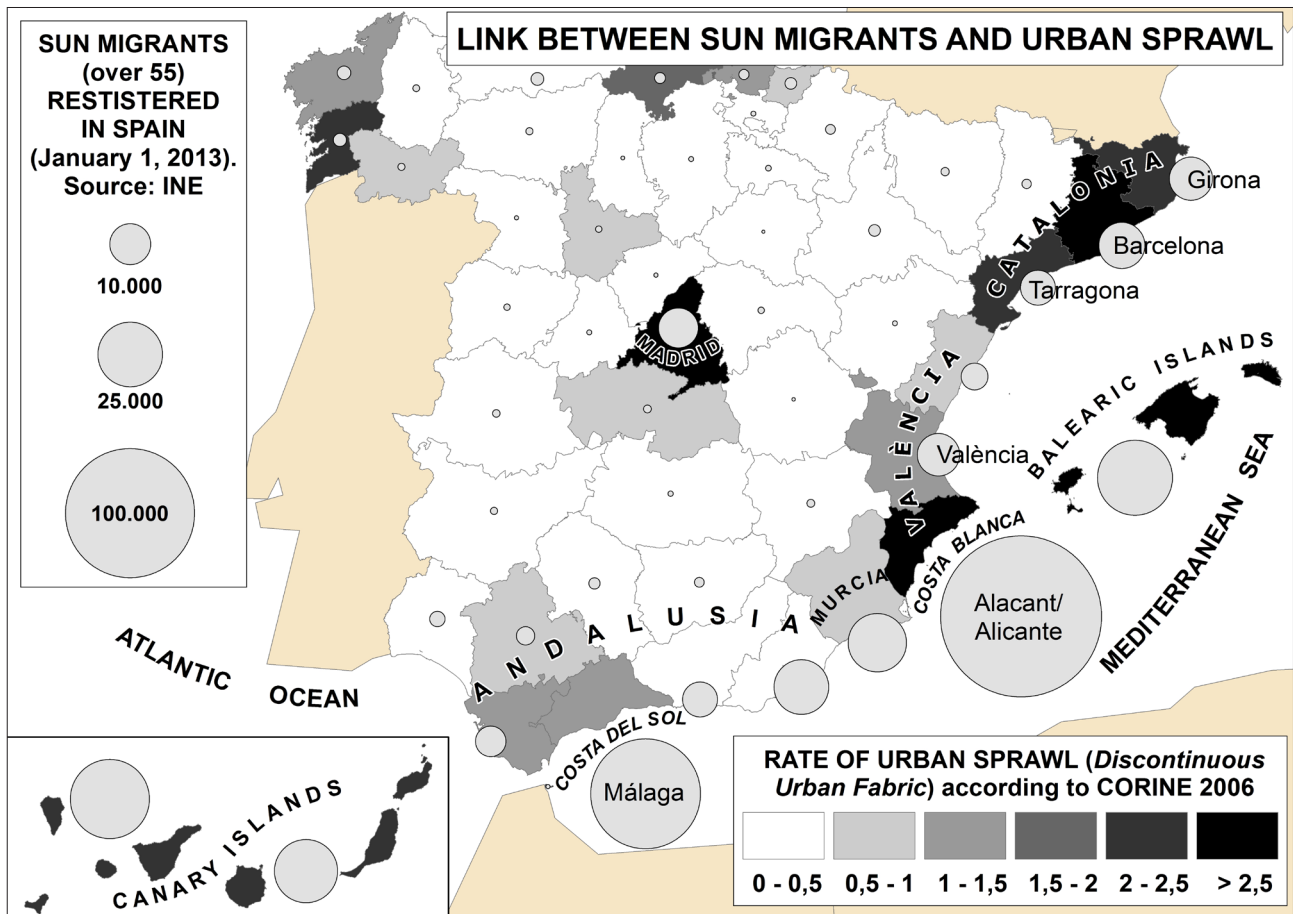
FIGURE 7 – Spain: link between urban sprawl and lifestyle migrants by provinces
SOURCE: CLC and INE (2013)

came those drawbacks that are usually connected to urban sprawl: landscape and environmental damage, traffic congestion, flood risk, water scarcity... Unlike the part of Europe which lies north of latitude 45º, in the Mediterranean basin rainfall is low and there is a chronic shortage of water, a fact which is exacerbated by urban sprawl expansion. According to Vera (2006: 166), water consumption in tourist urban sprawl areas such as Torrevieja (in southern Costa Blanca) doubles the water consumption corresponding to tourist compact cities such as Benidorm (in northern Costa Blanca).

There is an obvious connection in Spain between the number of lifestyle migrants in a given territory and the amount of hectares of urban sprawl that can be found there. According to CLC 2006, Madrid and Barcelona are the provinces where the highest percentage of urban sprawl can be found (6.6% and 4.45% respectively of those provinces' territory corresponds to this kind of land use, fig. 7). In both cases this is due to the high population numbers (6.5 million people live in Madrid, and 5.5 in Barcelona) and to the outstanding GDP of both areas, which entails that a sizable number of people living there have enough purchasing power to be able to afford a single-family (detached or attached) house. People living in urban sprawl around Madrid and Barcelona are mainly Spaniards. During the Spanish housing bubble many of them abandoned their former home in the compact city for a new house in a suburban area. As we have explained, they expect to experience there a new lifestyle, linked to modern phenomena such as environmental awareness, new communication technologies and global patterns of consumption.

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After Madrid and Barcelona, the highest rates of urban sprawl can be found mainly in tourist coastal provinces. In Alacant/Alicante (Costa Blanca), which, as we have seen, has more lifestyle migrants than any other province in Spain, urban sprawl constitutes 4.16% of the land. According to SIOSE data (2009), some areas in this province contain an extremely high percentage of urban sprawl: in the coastal district of Vega Baja, urban sprawl took up 8% of the land (and in its main town, Torrevieja, no less than 21%) (fig. 9), and in the coastal district of Marina Alta urban sprawl exceeded 10% of the total surface (in towns such as Dénia and Xàbia this number rose to 25%; in Calp, to a stunning 40%) (fig. 8) (Membrado, 2011: 435-436).

5. Costa Blanca: a paradise for urban sprawl and retired lifestyle migrants in Southern Europe

Mediterranean Spain has become the area in southern Europe were urban sprawl has grown the most and the fastest, thanks to the solvent demand by lifestyle migrants for single-family houses, according to the sprawling development patterns. Costa Blanca, a relatively small territory in coastal South Eastern Spain, contained more (retired or not) lifestyle migrants in 2012 (254,000) than the sum of those in Italy (150,000) and Portugal (68,000). To get an idea of the importance of urban sprawl and of lifestyle migrants in Costa Blanca, it must be said that its five coastal districts, which

FIGURE 8 – La Marina (northern Costa Blanca): urban sprawl diachronic map (1987-2006)
SOURCE: Membrado (2012)

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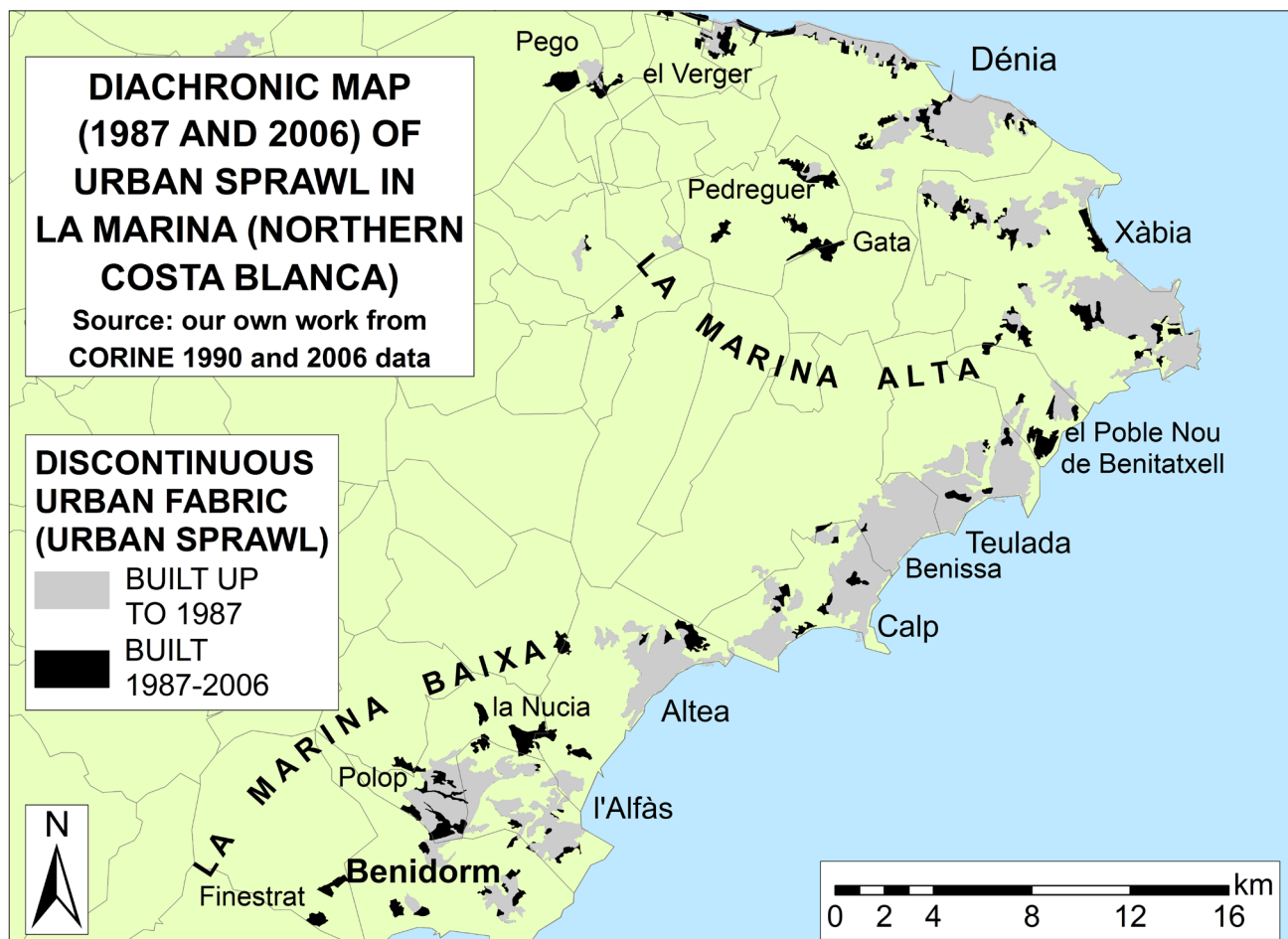
constitute just 0.68% of the entire Spanish territory, contain 7.7% of the Spanish urban sprawl surface, and no less than one third of all the retired lifestyle migrants living in Spain.

The biggest urban sprawl development connected to lifestyle migrants in Costa Blanca can be found in their northernmost (La Marina, fig. 8) and southernmost (La Vega Baja, fig. 9) districts. Both areas benefit from its proximity to Alacant/Alicante airport, which is very well connected (more than 40 daily flights) with the British Isles and also has regular connections with Scandinavia, the Benelux, Germany and Russia. In fact, many British residents in Costa Blanca usually travel to the UK for medical, work, family or other reasons.

In figure 8 we can see how during the Spanish real estate bubble there was a remarkable expansion of urban sprawl in La Marina. It went from 8,000 hectares in 1987 to 11.500 in 2006. Urban sprawl development was particularly significant in the pre-coastal area (3-7 km to the sea), because the coastal areas (0-3 km to the sea) were already densely developed before 1987. Thus the pre-coastal fringe acted as a spatial outlet for new growth. The same interior-coast development phenomenon, described by Crawford *et al.* (2013: 236) and by Kambly and Moreland (2009:11), has happened in equivalent areas in North Carolina and Florida.

In figure 9 we observe recent urban sprawl development in Vega Baja. As we can see, a vast increase

FIGURE 9 – La Vega Baja (southern Costa Blanca): urban sprawl diachronic map (1987-2006)
SOURCE: Membrado (2012)

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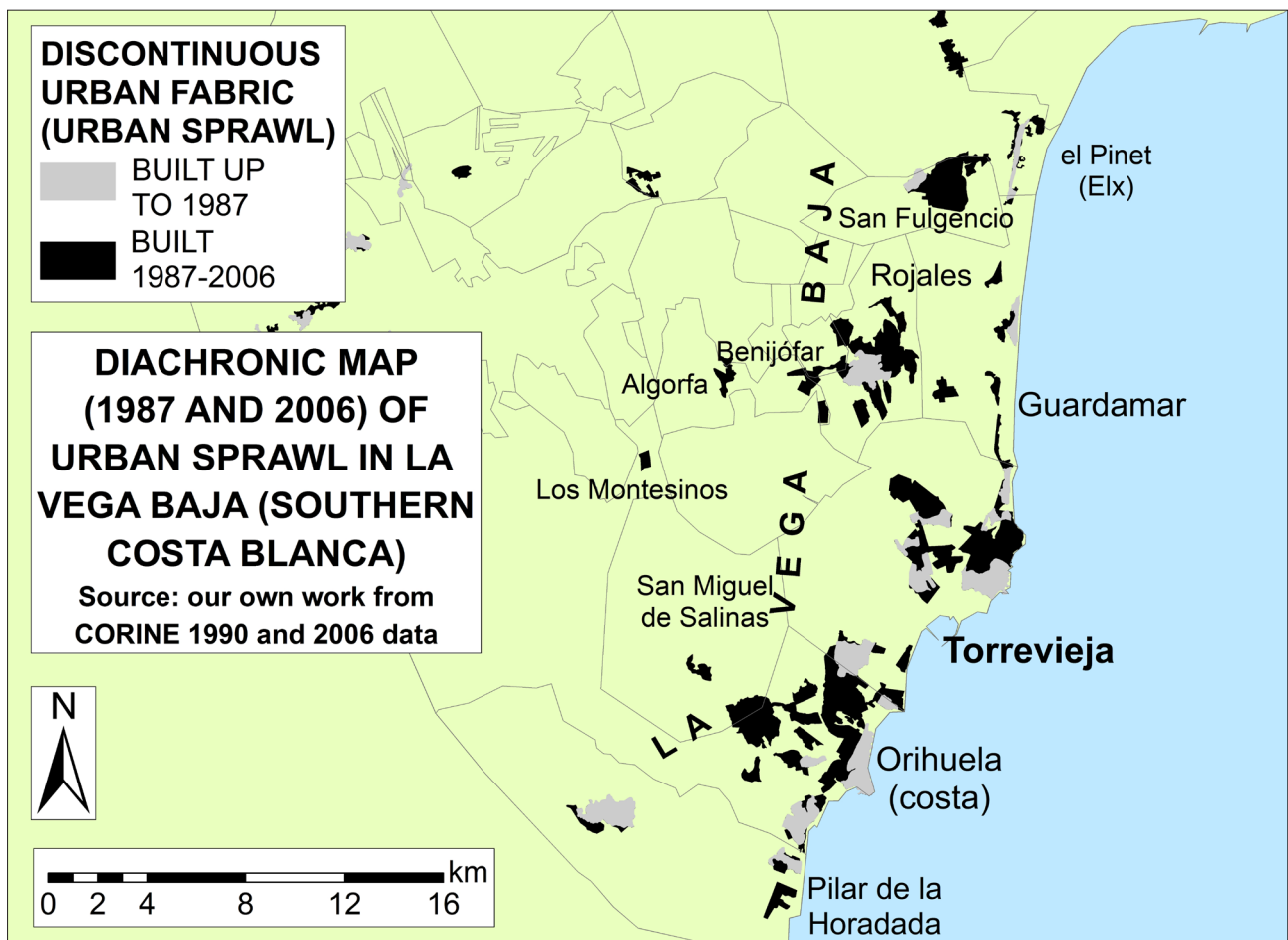
of urban sprawl took place there in a few years. Urban sprawl surface went from 1,600 hectares in 1987 to 6,300 in 2006. Single-family houses were developed both by the seashore and, especially, in pre-coastal areas. The distance to the sea is compensated by other amenities, especially golf courses. Thus, pre-coastal urban sprawl areas in Vega Baja are typically distributed around golf courses (Mata, 2007: 42). In fact, 7 out of the 14 golf courses existing in Costa Blanca are located in pre-coastal Vega Baja. And in 2012, pre-coastal Vega Baja contained the three Spanish municipalities with the highest percentage of foreigners: San Fulgencio (78% of its 12,522 inhabitants were foreigners), Rojales (77% of its 22,006 inhabitants) and Algorfa (72% of 4,755). Lifestyle migrants constitute more than half the population there. English is spoken there more than any other language, including Spanish. A Spaniard visitor could consider him – or herself lucky if he or she addresses people from San Fulgencio, Rojales or Algorfa in Spanish and is understood.

The large urban sprawl developments in Costa Blanca were driven by the high demand by lifestyle migrants (especially the British), favoured by town councils, and promoted by large construction companies and banks. Some developers, bankers and politicians got rich overnight through land speculation and unlimited urban growth. Many of their companies and banks have eventually gone bankrupt due to mismanagement. Many savings banks bought so much land, intending to build on it, that when the housing bubble burst, they had to be intervened or nationalized. But before the crisis started, much land had already been constructed on. That implied not only environmental and landscape drawbacks, but also the overcrowding of tourist areas.

As for the economic effects of retirement migration to Costa Blanca, we can list some advantageous and some disadvantageous effects. Among the former, retired migrants increase the demand for local services (real estate, trade/consumption, personal, health and elderly care services), thus attracting new labour, which will increase the number of consumers even more (Walters, 2002: 51; Huete & Mantecón, 2012: 163). The economic benefits of the immigrants' influx can be observed in the population increase of the places where they settle. E.g., Torrevieja (30% of lifestyle migrants) has grown fourfold in just twenty years (its population went from 25,000 in 1991 to over 100,000 in 2011); Rojales (75% of lifestyle immigrants) tripled its population in the same period (it went from 5,000 to 20,000). The population of San Fulgencio (80% of lifestyle immigrants) multiplied by 7.5: from 1,600 in 1991 to 12,000 in 2011). Another benefit, cited by Walters (2002:52), is that retirees have incomes based largely on pensions, which are independent of local economy, and recession-proof. However, Britons' incomes (Britons being more than a half of all retired lifestyle migrants living in Costa Blanca) have been hit by the devaluation of the pound. Before 2008, £1 equalled about €1.5; therefore a £1,000 pension equalled €1,500. Nowadays, a £1,000 pension equals about €1,150. Thus Britons can no longer afford to live as expensively as they did before –as a matter of fact, many of them simply cannot afford to live in Costa Blanca any more.

Among the disadvantages of retirement migration, also listed by Walters (2002: 52), we can mention that "rapid immigration carries the danger of local overpopulation – traffic congestion, overdevelopment, and so on. Migration may put unbearable strains on the local physical infrastructure (water, power, sanitation) and on the natural environment." This fragment by Walters refers to retirement migration to Florida, Arizona, California and other Sun Belt US states, but it also accurately describes the current situation in Costa Blanca. Overdevelopment has been so huge there that some urban sprawl areas have become *densely packed* sprawl areas, a paradoxical category, with all the drawbacks listed by Walters. No less paradoxical is the fact that lifestyle migrants, who moved south in order to increase their quality of life, have to see it eroded as their destinations become overdeveloped and overpopulated with new lifestyle migrants (Benson and O'Reilly, 2009: 621). As a matter of fact, some of the first lifestyle migrants who moved south several decades ago to settle in a rural, isolated location were later deprived of their particular haven of tranquillity when local authorities and developers built on those rural lands. Some of these lifestyle pioneers reported to the European Commission, the European Parliament and the European Court of Human Rights what they regarded as an instance of urban

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abuse, political corruption, and landscape destruction (Janoschka, 2011:232).

Another drawback is that, even though retired migrants tend to be in good health when they move to their new home, as they age they become increasingly disabled. The long-term cost of sustaining an ageing population may be larger than estimated (Walters, 2002:52). In the Spanish case, an aged population resulting from the arrival of senior migrants (and senior tourists) causes expenses that local authorities find it difficult to pay (Huete & Mantecón, 2012: 163), even more in the middle of an economic crisis like the current one.

Now as regards the social consequences of retirement migration to Costa Blanca, the huge development of this area, driven as we have seen by lifestyle buyers who wanted to live in neighbourhoods built in the urban sprawl spatial pattern, has created huge suburban areas isolated from the urban centres and the local people. Most of these suburban neighbourhoods have little or no public transportation, a fact which restricts the mobility of many of their residents, who tend to stay inside the suburb, with few entertainment options. Moreover, isolation and the distance to basic services – such as health centers or police stations – increase the perception of insecurity in these suburban areas.

Finally, regarding environmental impact, the consequences of this rapid, unlimited development have been devastating. The damage to the landscape and the environment, especially next to the sea, is irreparable. The Land Law passed by the Spanish government in 1998, which established that any non-protected piece of land could be built on (Rullan, 2011: 182) has had a heavy impact on some areas of the Spanish Mediterranean, such as Costa Blanca. In Costa Blanca there are some coastal protected areas: Montgó-Cap de Sant Antoni, Penyal d'Ifac, Serra Gelada or the lagoons of Santa Pola, la Mata, and Torrevieja (figures 8 and 9). Thus it might seem that there is no shortage in this area of places where nature can be enjoyed. The problem is that all those parks are partially or completely surrounded by urban areas. There is no transition at all between the natural parks and the urbanized surfaces. Particularly aberrant was the intervention in the environment of the lagoons of La Mata and Torrevieja, which is a paradigm of urban-sprawl-harassment of protected wetlands. These lagoons had been officially protected since 1989, a moment when their immediate environment was scarcely developed. 20 years later the urban sprawl had spread indiscriminately in all directions around both lagoons (Delgado, 2012: 629).

Due to its climate, landscape, culture and atmosphere, the Mediterranean coast is a place coveted by developers. Governments – at a local, regional or national level – that should have protected this area against any profit-driven building excess, instead chose to allow – either by action or by omission – developers to go on building to the point where a considerable part of a unique Mediterranean landscape has been irreversibly disfigured or lost. This is a serious drawback when competing in a market as dynamic and open as tourism, which increasingly regards the quality of the territory as part of the quality of the product (Mata, 2007: 40-44).

6. Conclusions

The Spanish Mediterranean region has seen an uncontrolled urban sprawl development during the last two decades. This growth was significantly driven by the solvent demand by lifestyle sun-seeker migrants, mostly retired from Northern Europe, who wanted – and were able to afford – a house that would allow them to live in the relaxing Mediterranean atmosphere. Retired lifestyle migrants registered in Spain increased by 7.5 times between 1991 and 2012. A vast majority of them (95%) chose the Costa Blanca and other Spanish Mediterranean regions (Costa del Sol, the Balearic Islands...) or the Canary Islands (which have a Mediterranean climate) to spend their retirement years.

This massive influx of lifestyle migrants created a considerable short-term wealth in Mediterranean Spain and, especially, in Costa Blanca. First, it generated revenues for (local, regional, national) governments via taxes. Second, it benefited the private developers, and also the local people who provided services for the newcomers. Nonetheless, the lack of a suitable urban planning that would have made it possible to control the developers' excesses led to the construction of overcrowded suburban areas. Thus, many of those migrants who had moved south expecting to improve their quality of life

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– among other things, by living surrounded by nature and tranquillity – eventually saw themselves (partly) frustrated as their new neighbourhoods became too developed. Another consequence of this overcrowding has been the irreversible damage caused to the environment and the landscape through the loss of fields, mountains, and forests.

The economic progress that urban sprawl development generated in the short term can have unpredictable economic consequences in the long term. Some suburban areas have become overcrowded, and many drawbacks derive from this process of densification in the Spanish Mediterranean region. First, those areas have the same disadvantages as any other suburban area: high consumption of water, energy and land per capita; absolute dependence on private vehicles; and destruction of the landscape and the environment. Second, they also have the problems of compact areas (traffic congestion, dense urban land) without any of their advantages (public transportation, public facilities, green areas, shops close to home…). In addition, the increasingly indebted towns can hardly provide basic services, such as cleaning or policing, to these suburban areas.

Given the growing shortcomings of the overcrowded Mediterranean Spain, the retired lifestyle migrants now living there may not have replacement within a few years. If local politicians want to avoid this, they should begin to work in a more rational and sustainable way. For instance, outskirt suburbs should be better connected to the central urban areas through public transportation, pedestrian walks and bike paths. In addition, suburbs should be provided with green areas and public utilities. These measures would improve the territorial and social cohesion among lifestyle migrants, who would thus be more motivated to overcome the barriers of language and culture, and the local people, who should stop regarding lifestyle migrants as mere consumers of services.

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L'accessibilità dei servizi di raccolta dei rifiuti in Romania: un'analisi multi-scala nell'ambito dell'UE utilizzando la cartografia tematica

Accessibility of waste collection services in Romania: a multi-scale analysis in EU context using thematic cartography

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Riassunto

Le difficoltà riscontrate nell'erogazione di servizi di raccolta di rifiuti presso la popolazione urbana e rurale rappresentano un problema di carattere ambientale a causa dello smaltimento incontrollato dei rifiuti. Il recepimento da parte delle legislazioni nazionali dei regolamenti dell'Unione Europea relativi alle questioni legate alla gestione dei rifiuti ha migliorato la situazione, ma nel caso della Romania la quota della popolazione ad avere accesso a tali servizi di raccolta dei rifiuti è ancora bassa se paragonata ad altri nuovi Stati Membri dell'UE. Una corretta analisi della questione ambientale necessita di un approccio multi-scala di questo indicatore. Le mappe realizzate evidenziano delle differenze di sviluppo nelle regioni rumene a livello NUTS 2, con le tariffe più basse della media dell'Unione Europea (2010). Inoltre le differenze più sostanziali si ritrovano nelle aree rurali nel corso del 2010. Le mappe tematiche ottenute consentono di effettuare un'analisi comparativa a livello nazionale e regionale, evidenziando contee, città e comuni della regione di Nord Est. Il ricorso a tali approcci geografici risulta interessante per un migliore processo di monitoraggio della gestione dei rifiuti.

Parole chiave

Analisi multi-scala, servizi di raccolta rifiuti, disparità , cartografia tematica, rifiuti municipali

Abstract

Low coverage of urban and rural population to waste collection services leads to various environmental threats caused by uncontrolled waste disposal. New EU regulations on waste management issues transposed into national laws have improved this sector, but, the population access to such services is still low compared to others new EU members. A multi-scale approach of this indicator is a necessary tool for a proper analysis of this environmental issue. The maps reveal that Romanian development regions (NUTS 2) have the lowest coverage rates at EU level in 2010. Furthermore, major disparities are reflected between Romanian counties in 2010. Thematic maps outline a comparative analysis at national and regional scale (Romanian counties & cities and communes of North-East Region) between urban vs rural areas in 2010. These geographical approaches are necessary for a better monitoring process of waste management sector.

Keywords

Multi-scale analysis, waste collection services, disparities, thematic cartography, municipal waste

1. Introduction

The non-compliant municipal waste management systems still create many environmental disturbances in the new EU Member States and the adoption of an efficient and sustainable management has become a priority for the EU. Solid waste management is a key component of public services which needs to serve the urban and rural municipalities in an efficient way in order to maintain a decent standard of public health (Marques e Simoes, 2008 ; Giusti, 2009). Major disparities between national and regional waste management systems are strongly related to demographic, geographic, social and economic features (Bianchini et al., 2011; Cifrian et al., 2012; Dahlen et al., 2007; Gellynck e Verhelst, 2007, Swami et al., 2011). Consumption patterns influence the municipal waste composition and the proper environmental awareness stimulates the separate collection and the implementation of best practices in this sector (Benitez et al., 2008, Sokka et al., 2010; den Boer et al., 2010) Nevertheless, some EU regions are not yet fully connected with waste collection services. In such cases, sustainable, regional and local waste management systems need to be improved. Spatial analysis of waste indicators at administrative territorial unit level is a proper tool in order to monitor this sector (D'Alisa et al., 2012; Mihai, 2013)

2. Waste collection coverage witihin EU-27 (NUTS 2)

Western Europe countries have full coverage of the population to waste collection services as shown in Table 1.

Regular waste collection services are provided for household waste and similar fractions such as wastes

TABLE 1 – Share of population with access to waste management services in Europe

EU-28 Member State/ year –last available data		(%) pop. served by waste collection services	EU-28 Member State/ year –last available data		(%) pop. served by waste collection services
Austria	2004	100	Luxemburg	2003	100
Belgium	2003	100	Hungary	2009	92.2
Czech Rep.	2004	100	Greece	2003	100
Denmark	2003	100	Slovakia	2005	100
Finland	2004	100	Slovenia	2009	94.5
France	2005	100	Poland	2009	79.1
Germany	2004	100	Romania	2009	63
Bulgaria	2009	96.7	Malta	2009	100
Ireland	2005	76	Lithuania	2009	91
Italy	2005	100	Latvia	2009	85
Netherlands	2004	100	Estonia	2009	79
UK	2005	100	Cyprus	2008	100
Spain	2009	100	Croatia	2008	93
Portugal	2005	100	Sweden		100
Non-UE					
Albania		77	Macedonia		72
Georgia		60	Turkey		77
Montenegro		76	Iceland		100

DATA SOURCE: OECD 2008, UNEP (2011) , Hoornweg e Bhada (2012), National Statistics

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from the institutes, shopping centers or offices. Furthermore, some states have implemented an efficient separate collection system, both for the residential and business sector emerging a sustainable market in this field. Private capital has a significant share in various stages of waste management sector. Inter-municipal cooperation plays a key role for regional waste management systems which may include urban, metropolitan and rural municipalities. Disparities between North and South or East and West are determined by a different trend of socioeconomic levels as well as waste management policies adopted in recent decades (Mihai e Apostol, 2012). New EU Member States still have no full coverage of population access to waste collection services (Mihai, 2012), the lowest rates are encountered in rural areas (eg. Romania, Poland, Bulgaria, Hungary). These disparities are obviously at regional scale (NUTS 2), in case of the large countries with a significant share of the rural population such as Romania and Poland (see Figure1).

Poor quality of waste management services are the main causes of environmental disturbances created by waste dumping. Globally, maybe 75% of waste generated is collected, leaving the remaining 25% unaccounted (Matthews, 2012). Uncollected wastes are burned or disposed on open dumps, rivers and streams polluting the surroundings. Even the coverage rate is 100 % in an
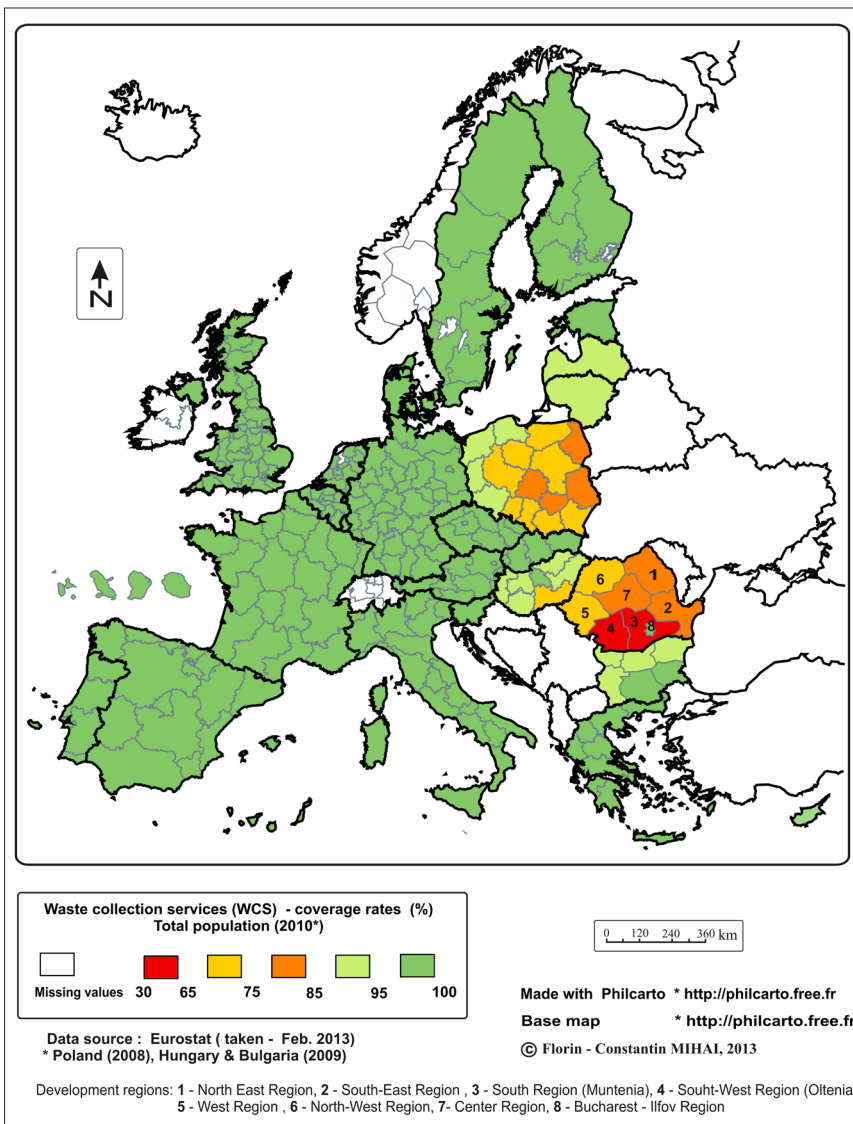
FIGURE 1
Coverage rate of waste collection services at NUTS-2 scale in EU-27
DATA SOURCE: Eurostat (feb.2013)

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urban area, perhaps only 80 % of the inhabitants actually benefit from waste collection services (Scheinberg et al., 2010).

Former communist countries of Europe have faced serious social and economic challenges in the transition period since 1990. Public administration has frequently ignored the municipal waste management issues due to the lack of proper funds. The major cities and peri-urban municipalities were covered by waste collection services compared to small towns and rural regions where poor facilities prevailed.

Implementation of the EU regulations in the new Member States it is difficult to achieve on this historical background. Waste collection systems in the Western and Northern Europe covered the entire population early as 2003-2004. Despite of this fact, the illegal dumping, fly-tipping, river and marine litter are still environmental threats in UK, Ireland, France, Italy, Spain, Portugal, Greece, Netherlands etc. Cleaning campaigns such as “Let’s do it “ point out such bad behaviors across all Europe.

New member states of the EU-27 are obliged to provide the expansion of these services and also to upgrade the existing waste management infrastructure. Also, the older EU members are facing the same transition from landfills to recycling and treatment facilities (Perkoulidis et al., 2010; Wolsink, 2010; Desmond, 2006). Full coverage of urban and rural regions is just a basic condition in order to fulfill the EU regulations.

One of the core issues in the field of solid waste collection is the failure to take account of the important differences between geographical regions, between nations, between cities and even within a city (Coffey e Coad 2010).

The mapping of waste indicators at different scales in Romania reveals regional and local inequalities in providing basic waste collection services between development regions (NUTS-2), counties, cities and communes.

3. Disparities between Romanian counties

Romania is divided into 41 counties (“judete”) which correspond to NUTS 3 level (Nomenclature of Territorial Units for Statistics) and the municipality of Bucharest as the capital city. Each county is further divided into cities and communes (specific to rural areas) which correspond to NUTS 4 level. The *commune* is the lowest level of administrative subdivision which is made up by one rural municipality which may include other villages with no administrative responsibilities. Romania has eight development regions which correspond to NUTS 2 level, but with no legal basis (not included in the Constitution) or executive responsibilities.

The main purpose of these regions is to comply the EU standards in order to apply for structural funds, to support the regional development , to collect and monitor the regional statistics. North-East Region has six counties as follows: Suceava, Botosani, Neamt, Iasi, Bacau and Vaslui with 3.302.217 inhabitants in 2011 (16,41 % of national stable population. This area is a part of Moldavia historical region and cover an area of 36.850 kms an has borders with Rep. of Moldova in East and Ukraine in North.

Romanian population is not fully covered by waste collection services in 2010 and some counties have poor coverage rates below 65% being exposed to illegal waste disposal practices (open dumps, river dumping, backyard burning). Environmental authorities monitor the waste statistics at NUTS 2 & NUTS 3 scales, but data for NUTS 4 level (cities & communes) are scarcely seen. The data reported by waste operators which may serve several localities (city + communes) are not broken down per municipality, therefore, it is often difficult to perform a geographical analysis at this scale.

The poor access of population to formal waste collection services in 2010 is explained by the lack of proper waste management facilities in rural areas of Romanian counties (eg Vaslui, Neamt, Buzau, Dolj, Olt, Teleorman, Giurgiu, Mehedinti). These services from urban areas have a lower coverage (concerning the number of inhabitants served) than rural areas as follows : Vrancea, Gorj, Sibiu counties or similar values among urban & rural areas such as Braila and Hunedoara (see Figure 2).

The high number of inhabitants unserved by waste collection services (15.000 – 45.000 inhabitants per county) within several Romanian counties explain the serious environmental threats caused by illegal waste disposal practices in the field.

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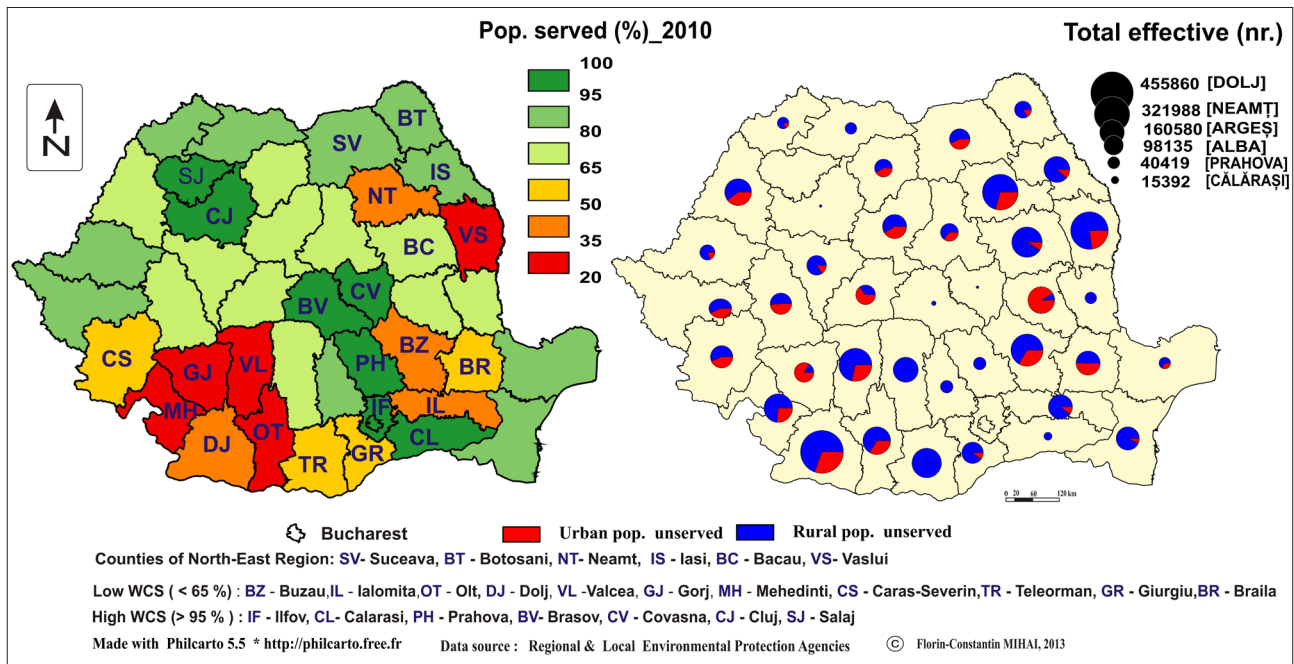
FIGURE 2 – Total population access to waste collection services in 2010
DATA SOURCE: Medius application _National and Regional Environmental Protection Agencies

Accuracy of data depends on the one hand, by the real residential population of cities and communes (without emigrants) and on the other hand, *by the veracity of reports made by waste operators and local authorities* ! Regional and local environmental reports reveal such data only at development region (NUTS2) or county levels (NUTS3). The partial sanitation fees collected by waste operators from urban residents may also explain the lower coverage rates for *urban population served* in official statistics.

Waste operators collect the waste generated and deposited into *community waste storages* of the main city, including for the inhabitants which does not pay the monthly fees. A low fee collection rate leads to poor quality services. Extension of waste collection services in urban and rural areas is a key objective of environmental policies in Romania followed by implementation of selective collection and recycling facilities. Romania has increased the total coverage rate from 51% in 2007 (EU adhesion) to 76 % in 2011 according to the National Statistics Institute. However, the National Environment Protection Agency database outlines that the South-West Region is the only region where total population coverage is less than 50 % in 2011 as follows : total (39,25 %), urban (74,98 %) and rural (10.12 %) ! Romania must close all non-compliant municipal landfills until 16 July 2017 and all remote localities should be served by the new regional municipal waste management systems across the country ! The current major gaps between urban-rural areas makes more difficult to accomplish this target. The development of proper waste management services in tourism regions (particularly in Romanian protected areas) should be a priority in order to mitigate the potential impact of tourists. The old non-compliant sites are replaced by sanitary landfills (serving a large city or as regional site at county level) and by transfer stations equipped with sorting and/or composting facilities. This new approach should stimulate the recycling programs and to reduce the amounts of waste landfilled, particularly for biodegradable fraction in accordance with EU targets.

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4. Coverage rates in urban and rural areas from North-East Region

This paper performs a geographic database for North-East Region in order to reveal a spatial analysis of waste collection rate in a multi-scale context. Public waste collection services were gradually leased to the private sector and major infrastructure investments (carried by EU funds) have improved their quality. The liberalization of this sector and new methodologies of waste statistics have led to significant oscillations in coverage rates of urban population access to waste collection services between the pre and post accession periods (Mihai et al., 2012, Mihai, 2013).

The reports on the status of environmental factors presents only aggregate data at the county level, which *cannot capture the local territorial disparities*. Extension of WCS from cities was accelerated by the transposition of *the EU acquis* into national regulations.

Most operators are based on these estimates and *not by the actual number of individual contracts concluded*. These inaccuracies have repercussions on *the real collection rate* of stable population in 2010 (which in reality is higher than those resulting from waste statistics). The overvaluation of stable population (which includes the citizens working abroad) have most influenced the real level of coverage rates from urban areas of Neamt and Vaslui counties (Mihai, 2013). The administrative territorial unit of a city often includes the main city and suburbs localities.

The suburbs include rural municipalities which may not be served by waste operators these areas are often predisposed to illegal waste disposal practices. The collection rate is often calculated taking into account the whole population within the administrative territory of the city and therefore, there is no information for each suburban locality.

The waste collection is regularly provided for all major cities (> 50 000 inhabitants) compared to the poorer small towns with strong rural features (< 20 000 inhabitants). The remote villages within small urban administrative areas are frequently neglected by waste operators. Roznov city had no formal waste collection services until 2010, but new separate collection system has been operational since 2011 through a PHARE project. Several *communes* were declared towns în the period 2004-2007 even if they did not meet the criteria for urban infrastructure (including the existence of a formal waste collection system). These new urban areas led to significant changes regarding the share of rural and urban inhabitants from a total population of a county. The best example is the Suceava county where 8 communes without WCS had been declared cities in 2004 as follows : Broşteni, Cajvana, Dolhasca, Vicovu de Sus, Frasin, Liteni, Milisauti, Salcea which increased the percentage of urban population from 35% in 2001 to 43.4%. (LWMP Suceava, 2008).

The same situation was encountered across other counties such as Murgeni (Vaslui county), Podu Iloaiei (Iasi county), Roznov (Neamț county), Flamanzi, Bucecea, Stefanesti (Botosani county). Poor waste management systems were widespread in these new urban areas until 2009.

Local rural authorities have begun to set up their own sanitation services or to lease them to private operators from urban areas under the EU regulation pressure. The expansion of WCS from urban to rural areas is emerging in 2010 for several counties such as Suceava, Botosani and Iasi where coverage rates are frequently over 90 %.

The waste operator of Iasi city ("SC Salubris SA") has significantly expanded his activity in rural areas, particularly after the closure of rural dumpsites in 2009, serving about 153 931 people from 43 communes. Waste operators from smaller towns have also expanded their services toward the surrounding localities. On the other side, some waste operators from Botosani county serve only rural localities such as "DEEA Cleaning Srl" (11 communes - 37 008 inhabitants), Pavra SRL (89361 inhabitants in 24 communes), "REGAN TRANS SRL Roma" (57 323 inhabitants, 16 communes) exceeding the share of urban operators. Significant increases from one year to another was recorded in Botosani county (rural coverage rate of 26.82% in 2009 increasing to 84.44% in 2010 !) and Iasi county (44.38 to 66.24% in 2010) according to the Regional Environmental Protection Agency Bacau. Traditional waste collection (mixed) prevails across the rural municipalities and the amounts of waste collected are transported to urban landfills in the proximity after the closure of rural dumpsites in July 2009.

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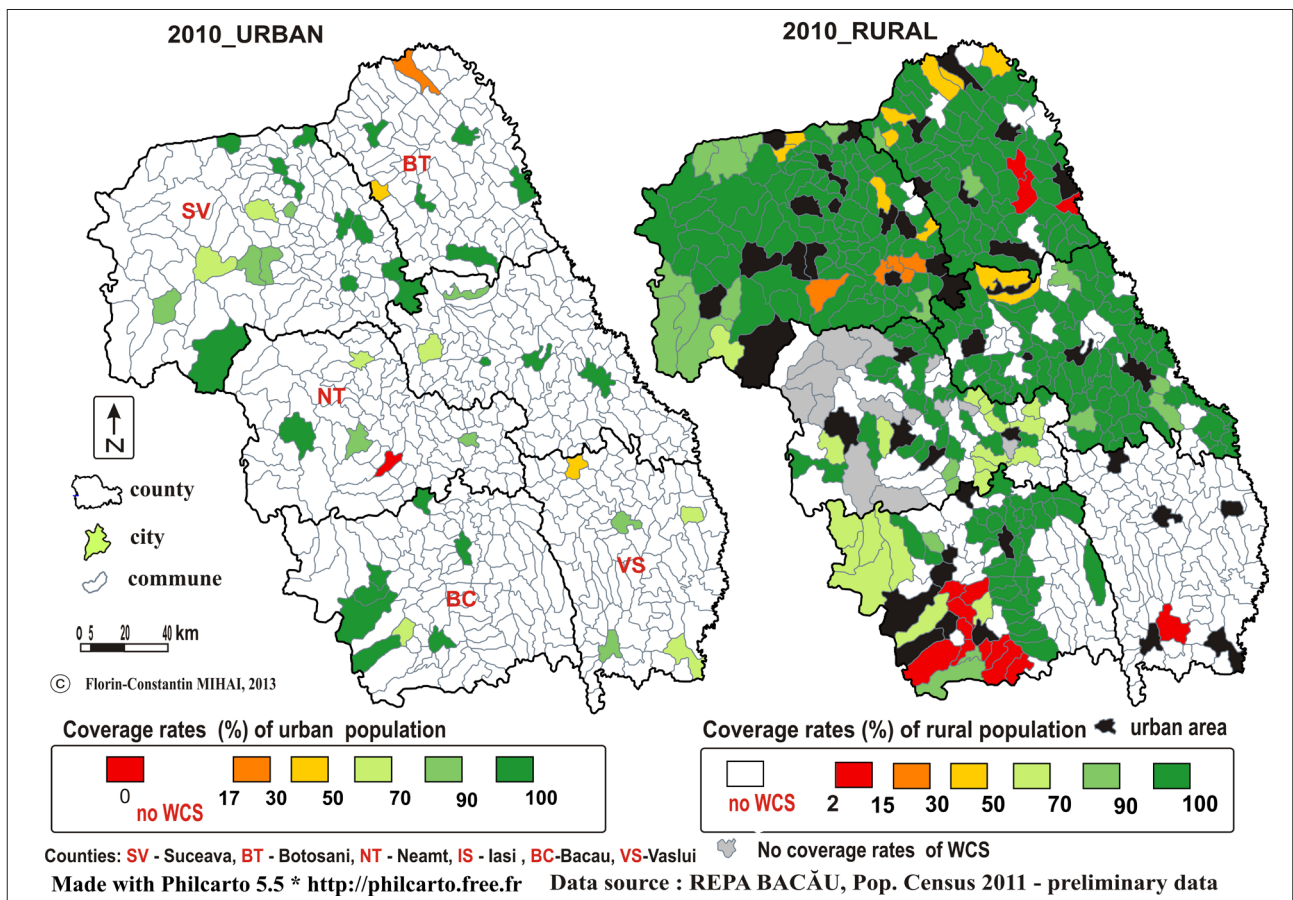
FIGURE 3 – Accessibility of urban and rural communities to WCS in North-East Region

The high coverage rate of rural population to WCS does not necessarily imply *an efficient waste collection system*. Separate collection is scarcely seen and illegal dumping is still widespread in the field. On the other side, coverage rates may be even higher in reality due to overestimation of stable population at the county level (National Institute of Statistics – data for 2010) caused by external migrations (people working abroad).

Furthermore, the lack of basic waste management services in rural territory of Vaslui county (exception Zorleni commune with 206 people served) encourages the illegal waste disposal practices in the study area as shown in Figure 3.

The corridor valleys and *subcarpathian depressions* from the western region are best served by WCS unlike isolated Moldavian Plateau areas from Bacau and Neamt counties or critical situation from rural areas of Vaslui county.

Mountainous region of Suceava is better served by WCS which mitigates the local pressures on rivers than Bacau and Neamt counties (lower rates). Development of integrated waste management systems in major cities of counties from the study area (Iasi, Bacau, Piatra Neamt) has created a favorable framework for the extension of WCS in rural areas from the surroundings. This economic segment has known significant progress in a short period of time (2008-2010). Neamt county has a lower coverage rate in 2010 concerning the rural population access to waste collection services in official statistics, but the field trips reveal that several rural municipalities have set up their own sanitation services or contracted private waste operators. Such municipalities

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(the gray polygons) were not included in the statistical survey of National Environment Protection Agency (NEPA–"GD MUN" – statistics).

Urban waste operators have expanded their activities to peri-urban communes of Piatra Neamt city (SC Bratner Ecological Services SA), Roman city (SC Rossal SA) and Targu Neamt city (SC ECO TG Neamt).

The private sector is significantly emerging in the recent years. Accessibility of waste collection services is poor or non-existent in case of the remote regions to the cities (southeastern of county) or for those isolated from the main traffic roads plus some communes from the mountain region.

Major disparities are revealed in the case of the Bacau county between the western (mountain and subcarpathian sector) and eastern areas (overlap on Moldavian Plateau) due to socioeconomic differentiations across the county. Localities from Siret and Bistrita valleys (corridor sector) are crossed by important traffic roads (European and national roads) which allowed an easier extension of waste collection services from the Bacau city to the surroundings. The urban waste operator (SC SOMA SRL) serves 31 communes and the amounts of waste collected are disposed at the sanitary landfill located in "Nicolae Balcescu" commune. The mountainous western half of the Bacau county (urbanized area) allows an easier extension of waste collection services from the cities located on Trotuș valley toward the surrounding communes leading to a higher coverage rates among the upstream localities of Comanesti and Moinesti cities served by urban waste operators.

The development of these facilities has been possible due to the improving of waste management infrastructure through EU funded projects. The low coverage rates for some localities in 2010 outline the early stage of these services in the southwestern of the county where illegal waste disposal practices are inevitable. Remote communes from the main urban areas and also isolated from major traffic roads due to geographical features (located on subcarpathian hills and Moldavian Plateau) still have no access to formal waste collection services. The costs of waste collection and transport services are reflected in higher sanitation fees charged by private operators. Long distances from a village (waste generation source) until the disposal or recovery facility (such as sanitary landfills or transfer stations) are real challenges for local communities taking into account the affordability of low-income locals concerning the specific costs. Extension of sanitation services to these geographic regions will be possible through large-scale projects such as integrated municipal waste management systems financed by EU funds (SOP ENV).

The local authorities are obliged by law to provide waste collection for localities under their administration. Regional sanitary landfills are under construction as part of an integrated waste management system which supposes to cover all urban and rural communities within a county. Waste hierarchy of EU policy cannot be applied efficiently in Romania due to the low coverage rates of the population access to basic waste collection services and poor recycling and treatment options. The full cover of WCS will be just a tiny step for a proper waste management system and it must be followed by a correct separate collection of waste streams (paper/carboard, plastics, glass, organic waste metal and aluminium cans) recycling centers, sorting and composting stations, environmental education, sustainable and competitive market in the waste management sector.

5. Conclusions

Spatial analysis of waste collection rate in a multi-scale context reveals national, regional and local inequalities in providing *basic waste collection services*. Regions of the large EU countries (such as Romania and Poland) are not fully covered by organized waste management services particularly in rural areas. Bad practices such as illegal dumping or backyard burning of wastes generated by rural communities are serious environmental threats. Thematic maps are useful tools in order to outline the territorial disparities between Romanian counties, cities and communes from North-East Region concerning the access of urban and rural population to WCS. Geographical analysis of waste indicators is imperative for a proper monitoring process of waste management sector. Spatial implications of this sector cannot be ignored any more in environmental studies, in national, regional and local waste management plans or environmental reports.

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Distribuzione spaziale dei parametri delle discariche rurali in Romania

Spatial distribution of rural dumpsites parameters in Romania

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Riassunto

La cattiva gestione di impianti di trattamento dei rifiuti in Romania si è tradotta nello smaltimento illegale in siti localizzati in prossimità di insediamenti, soprattutto rurali. Fino al luglio 2009 questa pratica è stata regolare in tutte le regioni rurali, momento in cui la chiusura delle discariche è diventata obbligatoria secondo la normativa del governo nr. 345/2005 che ha recepito la direttiva sulle discariche 1999/31/CE. Nell'articolo viene proposta un'analisi spaziale sulla distribuzione dei rifiuti nelle discariche rurali, sulla base di unità amministrative territoriali a scala nazionale, regionale e locale. Questi dati sono correlati con le caratteristiche geografiche e ne rispecchiano i modelli spaziali di distribuzione nelle unità amministrative romene. Le analisi, supportate da ricerche sul campo, sono necessarie per una migliore comprensione del problema dello smaltimento illegale dei rifiuti. Ciò vale soprattutto per le regioni rurali, ancora esposte a tali pratiche e con un notevole inquinamento dell'ambiente locale.

Abstract

Poor waste management facilities led to uncontrolled waste disposal on improper sites in the proximity of human settlements particularly in rural areas. This bad practice prevailed in all rural regions until 16 July 2009 when these garbage dumps should be closed and rehabilitated according to Government Decision number 345/2005 which comply the Landfill Directive 1999/31/EC. The paper aims a spatial analysis of waste indicators concerning the rural dumpsites at administrative territorial units on national, regional and local scale. These data are correlated to geographical conditions reflecting spatial patterns in their distribution across and within Romanian counties. The role of geographical conditions is revealed at local scales in these spatial patterns due to a low coverage rate of rural communities to waste collection services. Such analysis supported by field observations is necessary for a proper understanding of illegal waste disposal issue. Rural regions are still exposed to such bad practices polluting the local environment.

Parole chiave

Analisi spaziale, indicatori di rifiuti , zone rurali, discariche, gestione dei rifiuti

Keywords

Spatial analysis, waste indicators, rural areas, dumps, waste management

1. Introduction

Non suitable waste management systems are a serious environmental threat on a wide scale across the world (Karak *et al.*, 2012). Noncompliant landfills and illegal dumping are the main options as a treatment solution of waste generated by urban and rural localities. Poor infrastructure and the lack of proper waste collection services led to the pollution of the local environment (rivers & streams, lakes, forests, agricultural land, roadsides etc.).

Rural regions are more presdisposed to illegal dumping due to the lack of investments in this sector. Pollution derived from rural dumpsites in emerging economies such as China and India are complex and threatening the human health (Guan *et al.*, 2012; Chunhui e Ping, 2008; Lakshmikantha, 2006). Furthermore, rivers are frequently exposed to waste dumping in the proximity of rural households (Obeta e Ochege, 2014; Breg *et al.*, 2007;)

Illegal waste disposal sites are also encountered across rural EU countries, despite recent improvements in waste management infrastructure (Skoczko, 2003; Skourides, 2008; Mihai, 2012). GIS techniques and multi-criteria analysis are used in order to determine the rural areas predisposed to illegal dumping (Borrell *et al.*, 2014; Mihai et al, 2013; De Feo *et al.*, 2013). Waste management systems from rural areas of EU countries need to be better supported by central and local authorities in order to mitigate these bad practices (Căpățînă e Simonescu, 2008, Passoti, 2010; Gabrščeк e Išljamović, 2011; Benjamin, 2011).

This paper aims a spatial analysis of statistical parameters (number, surface – ha/sq.m) concerning the rural dumpsites at different geographical scales such as counties (Romania), communes (North-East Region) and the villages of Neamt County.

Regional and micro-scale analysis outline the role of geographical conditions in spatial patterns of rural dumpsites parameters. Poor data about the rural waste management system from Romania are available in environmental reports and quality of those provided are often questionable. There is no database concerning the rural waste indicators at the county or commune scale. In this context, this rural environmental issue is barely debated in the Romanian scientific literature and a geographical approach is absent.

2. Spatial analysis at national and regional scales

Romania has 8 development regions which correspond to NUTS 2 classifications, but these are not quite administrative borders with no executive attributions and a constitutional basis. These regions include 41 counties (NUTS 3) and the Bucharest municipality as a capital city. Each county is further divided into cities and communes (NUTS4). The commune is a lower administrative division specifically for rural areas which may include one or more villages. North-East Region is a part of the historical region of Moldavia and includes 6 counties as follows: Suceava, Botosani, Neamt, Iasi, Bacau and Vaslui. Each county has a County Council as a local authority of public administration, which coordinate the urban and communal councils within a county in order to provide public services. Regional development regions play an important role in accessing EU funds, including for the waste management sector. County councils supervise the new local integrated waste management systems supported through structural funds.

Regional authorities and waste operators often ignored rural areas concerning the waste management issue before EU accession. Poor waste management infrastructure led to the spread of dumpsites across rural regions. Every commune and village disposed their wastes on such improper sites (Mihai e Lămășanu, 2013). Almost every river or stream in the proximity of households were predisposed to illegal dumping particularly in mountain regions. Such dumpsites had a mixed composition, including household waste, agricultural waste, sawdust, manure, demolition and construction waste, hazardous waste (tires, batteries, WEEE etc.) threatening the community health and local environment.

Development of waste collection services (WCS) in rural Romania was a lazy and lengthy process. Following the EU accession in 2007, eight Romanian counties still did not provide such services in rural areas in 2008

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and in another 6 counties, the share of rural population with access to WCS was very low <10% (Apostol and Mihai, 2012).

Next year, the overall situation has partially improved, but following counties have no access to the WCS in rural areas such as Ialomița, Teleorman, Dolj. In case of Vaslui county, only 207 people (0.07%) were connected with such services from Zorleni village. Dolj and Mehedinți had a coverage of only 2%, and in 8 counties these rates are below 30% (including Neamț county). Lack of proper waste management facilities has increased the amounts of waste disposed in open dumps. Counties from North-East, South-East and South of Romania have the lower coverage rates as shown in Figure 1, being most vulnerable to waste dumping except following counties: Ilfov, Călărași (over 90%), Suceava & Tulcea (over 70%), Dâmbovița & Argeș (over 50%). Larger open dumps are frequently found in the proximity of human settlements located in regions with a low risk of flooding (plateau areas, inter-fluvial hills, fluvial terraces) or on the plains where rural population density is higher and human settlements are more bundled in the absence of geographical constraints. Such dumpsites are more extensive and frequent in well populated counties with a significant share of rural population and poor access to the WCS (<10%) where plains and low hills dominate the landscape (Apostol and Mihai, 2012).

The North–East region has 3.302.217 inhabitants in 2011, according to the last population census data and include 6 counties, 46 cities, 506 communes and 2.414 villages. This region has a harmonious combination between various relief types as follows from West to East: mountains (Eastern Carpathians – 30%, 2100 m max. altitude), Moldavian Subcarphatians (30%) which include several depressions and hills (higher altitudes around 700-800m), and 40% goes to the Moldavian plateau. This last form of relief occupies more than 70% of the surface in the counties of Botosani, Vaslui, Iasi.

Mihai et al., (2012b) outlined some spatial patterns concerning the ratio between the number of dumpsites at commune scale and number of villages that form a commune:

FIGURE 1 – Rural dumpsites parameters related to WCS rates at the county scale (NUTS3)

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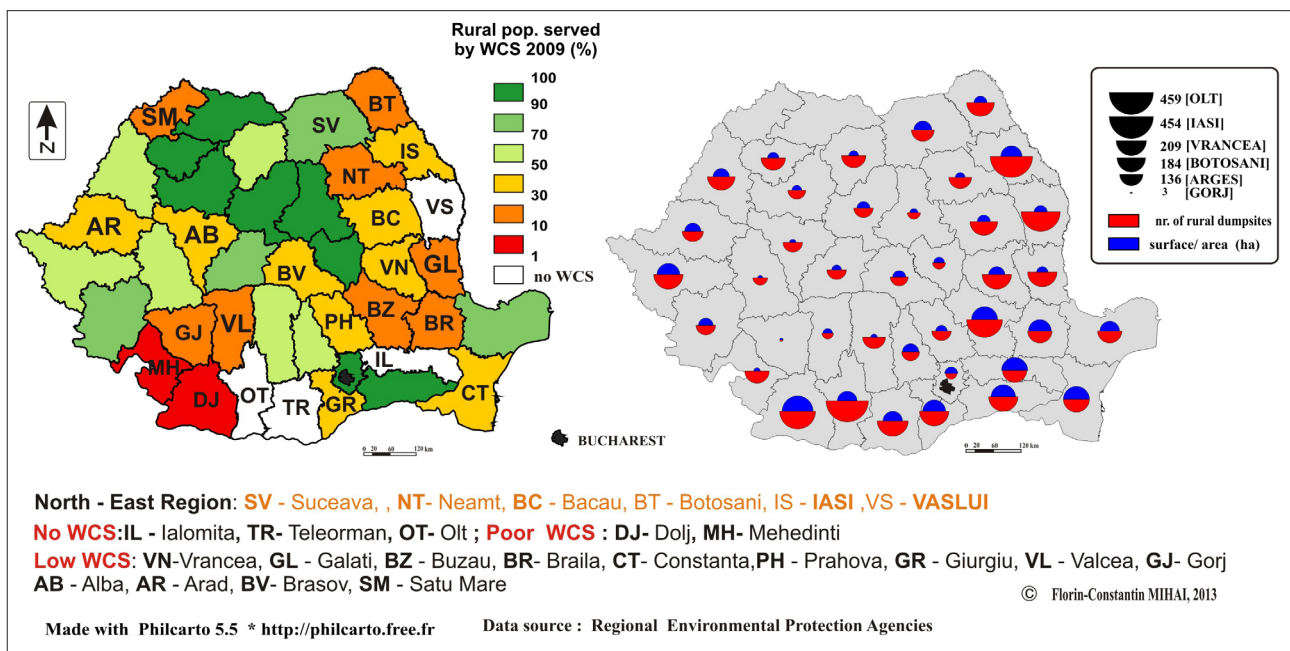
- in the mountainous western half of the counties Suceava, Neamț and Bacău the number of dumpsites is less than in the eastern half (dominant landscapes as Subcarpathian depressions and hills, plateau) as shown in figure 2;
- Botosani, Iași and Vaslui counties are overlapping the Moldavian Plateau, number of dumpsites are larger than the other three counties (particularly to mountainous western half). Frequently, each village from a commune reported the presence of a waste disposal site and sometimes number of these sites exceeds the number of villages that form the commune. This fact is due to the large rural population, especially in Iași County.

Physical-geographical transition of Suceava, Neamț (see figure 3) and Bacău counties influenced the distribution of rural dumpsites areas (ha) within the same county, while in eastern counties (Botoșani, Iași and Vaslui) this distribution is more uniform due to a more homogeneous landscape of Moldavian Plateau (Mihai *et al.*, 2012b) as shown in Figure 2.

The North-East region is still facing the uncontrolled waste disposal (due to a partial coverage rate of rural population access to WCS) polluting local environmental factors such as the rivers and streams, ground waters, forested areas, agricultural lands in the proximity of built-up areas. Suceava, Botosani, Iași, Bacău and Neamț counties have made significant progress after

FIGURE 2 – Spatial patterns of rural dumpsites parameters in North-East Region

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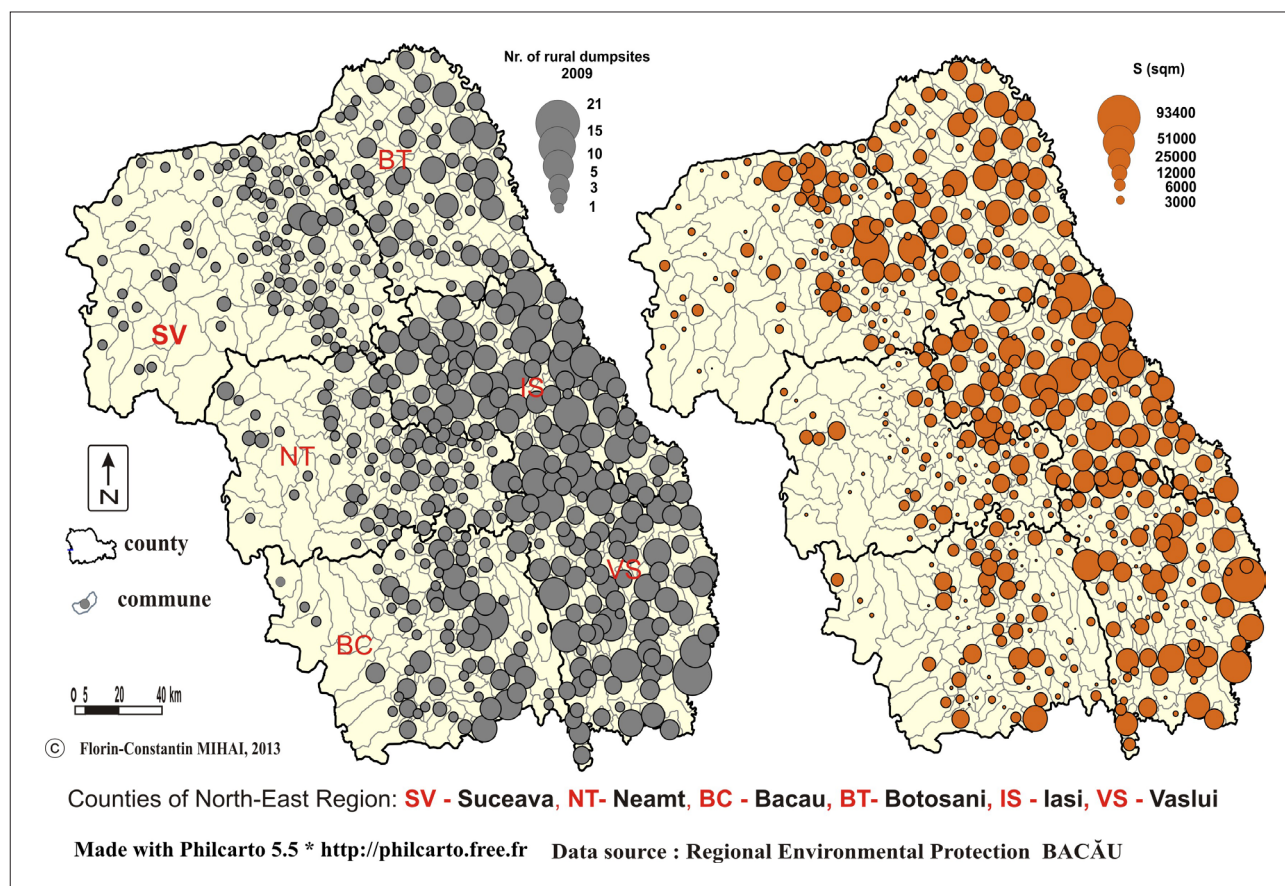
2009, regarding the development of waste management facilities in rural areas, unlike Vaslui where this sector was almost non-existent in 2010.

3. Spatial analysis of micro-scale (villages of Neamt County)

Following the multi-scale analysis of the geographical distribution of rural dumpsites at county & commune level, such an analysis is also performed at the micro - scale for villages of Neamț county. This has been possible due to inventory of these dumpsites made by EPA Neamț in partnership with local authorities in December 2008, data are provided on this scale in the annual environmental report (EPA Neamț, 2009). Nevertheless, it should be noted that these data differ from those used in the analysis at commune scale in the North-East Region as shown in Figure 2 (Neamț county data were provided by the National Environmental Guard, County Commissariat, September 2009).

Statistical data representing the total amount of surfaces occupied by these sites within a village because there may be one or more such sites across a village. Comparing Figure 2 to Figure 4 it is noted that there are mostly the same geographical distribution of dumpsites surfaces, high values (> 1 ha or 10000 sq.m) focusing on the subcarpathian region of Bistrița river where wastes

FIGURE 3 – Geographical features of Neamț County

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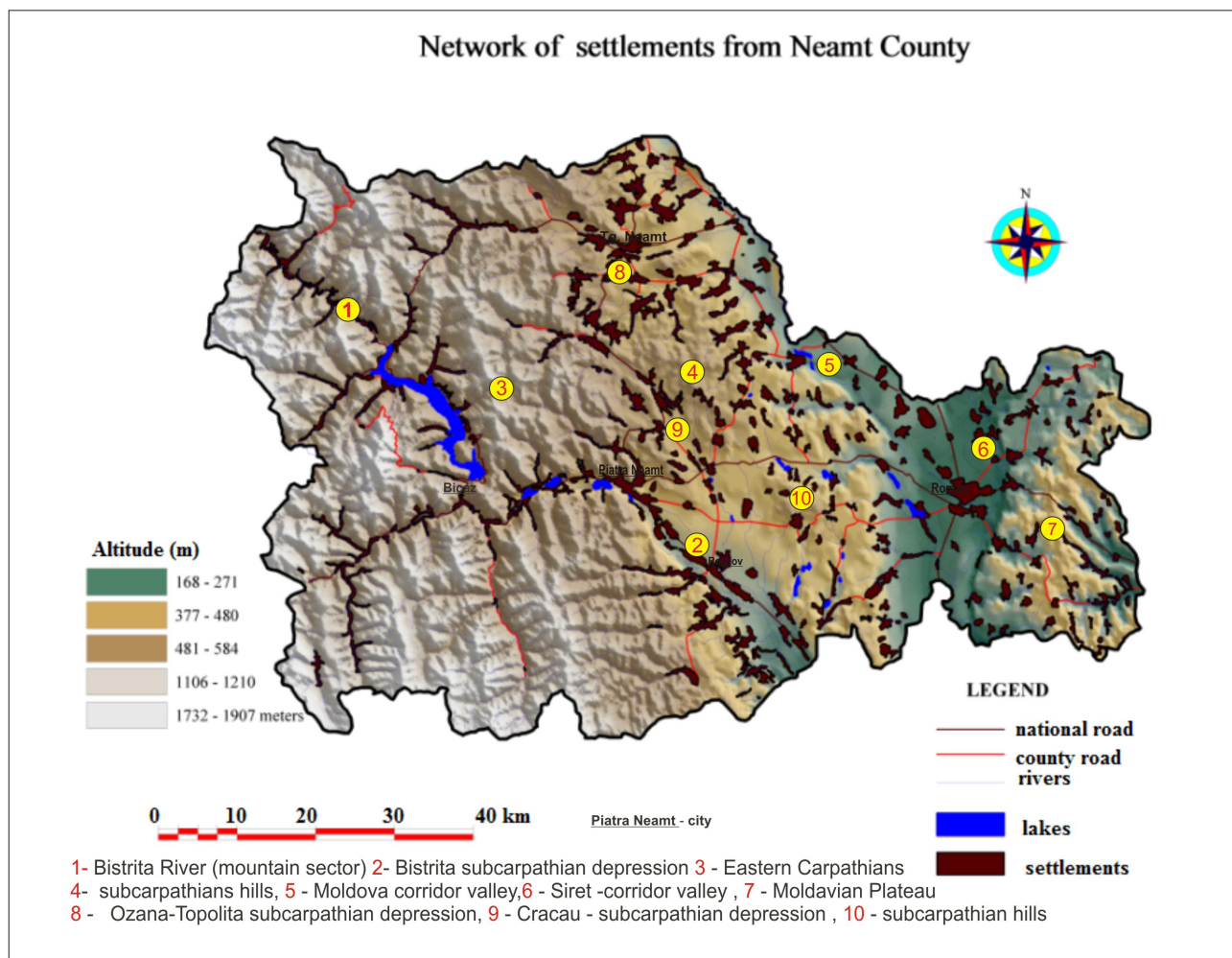
are often disposed on alluvial plains across several villages such as Cut (1.5 ha), Brăşăuti (1ha), Săvineşti (2ha), Zăneşti (5ha), Şovoaia and Ruseni.

These villages are vulnerable to flash floods in the warm season, local dumpsites are often temporary which may explain the differences regarding the surfaces at commune level between December 2008 and September 2009 or as open dumps located on older terraces of Bistriţa river close to settlements such as Izvoare (2ha), Traian (0.55 ha), Podoleni (1.7ha) and Costişa (0.2 ha). Also, in densely populated localities located on terraces and floodplain of Moldova river larger open dumps prevail in following villages: Săbăoani (3ha), Cordun (3ha), Pildeşti (2ha), Horia (0.45 ha). In the same context enroll the villages which dispose the wastes on floodplain of Siret river as Tămăşeni (3ha) and Adjudeni (1ha). Figure 3 & Figure 4 reveal the role of landscape in spatial analysis of rural dumpsites at local scale. Open dumps are common and usually occupy small areas (<0.5 ha) in the Moldavian Plateau with some exceptions, such as Valea Ursului (4ha) Bucium (1ha) or Recea (3ha).

Communes of this region have a large number of small villages in their administrative structure, these villages are sparsely populated and aging (<500 inhabitants) such as Oniceni, Icuseşti or with between 500-1000 people in villages Bozieni, or Valea Ursului and Staniţa.

Subsistence agriculture and isolation from major traffic arteries & cities contribute to a poor economic situation that lead to a decrease of consumer goods which also imply a lower waste generation rate. Furthermore, waste recovery in own households (organic

FIGURE 4 – Geographical distribution of dumpsites areas (sqm) at micro-scale (village)

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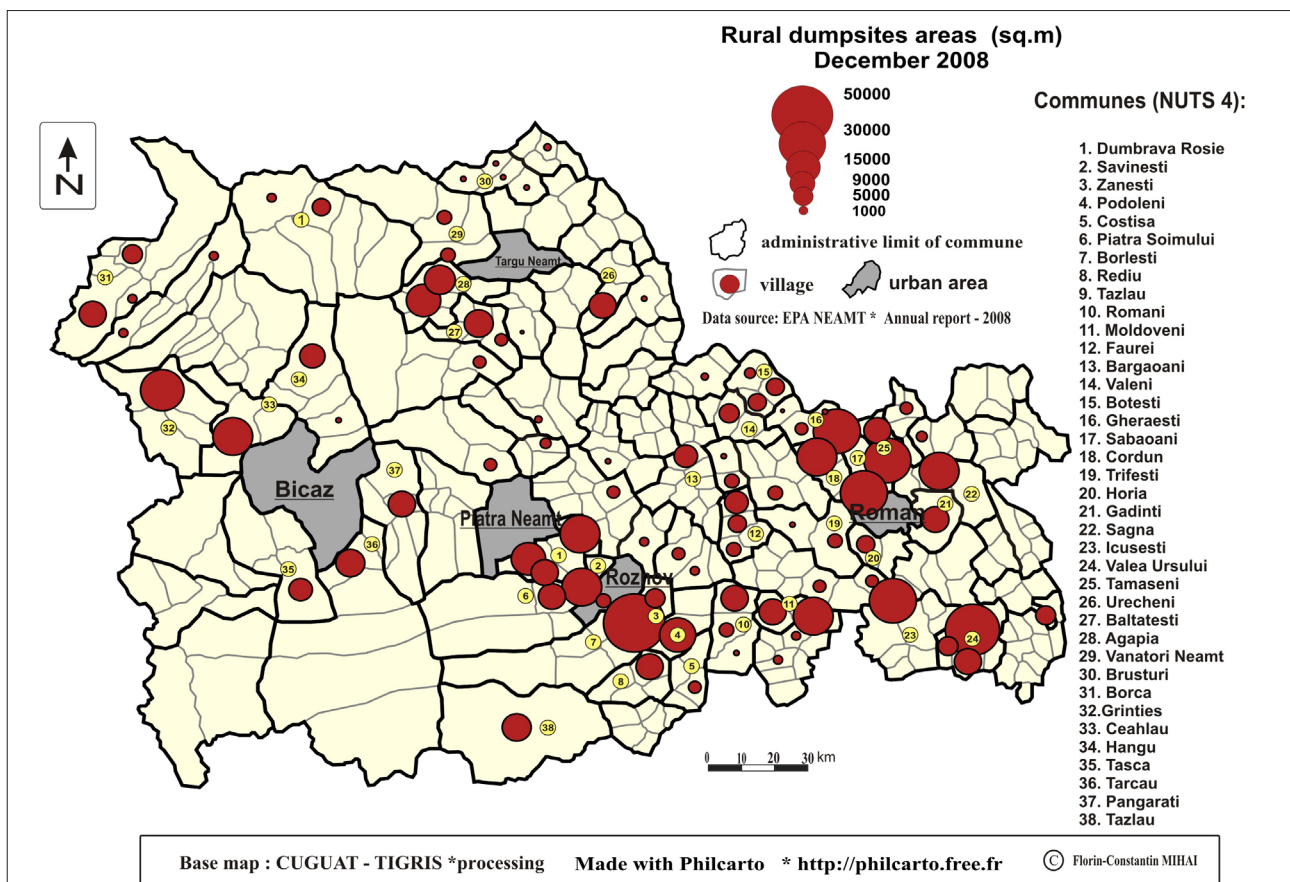
waste as a food source for livestock or compost, reuse of recyclable) mitigates the amounts of waste disposed on improper sites. This goes for hilly regions of central and south of the county and only in some cases rural dumpsites having larger areas such as Budești (0.7 ha) Moldoveni (2ha) Hociungi (1ha), Goșmani (2ha). In subcarpathian region, these sites are larger in case of tourist localities such as Agapia (1,2ha), Filioara (1,6ha), Bălțătești (1,07 ha). Development of waste collection services in such areas should be a priority in order to avoid the prejudice of local tourism. In the same context fits the localities within the mountain region where wastes (household, agricultural and sawdust) were dumped on the banks of streams and rivers which are frequently flooded (Borca – 1 ha, Madei – 0.5 ha, Grințies – 2ha, Ceahlău – 2 ha, Hangu – 0.9 ha, Tașca – 0.75 ha, Pângărați – 1ha, Tazlău– 1.075 ha, Pipirig – 0.41 ha, Piatra Șoimului – 1ha).

Differences between surfaces of dumpsites reported in December 2008 and September 2009 highlights the temporary nature of these sites in mountainous regions and on floodplains (extra-Carpathian region) which were frequently flooded. This comparison is made at commune scale, thus data at the village level is compiled for 2008. Such an analysis is relevant in the context of poor waste management services.

The significant decrease (Dec 2008/Sept 2009 ha) in the mountainous region is found for following communes: Borca (1.5/0.27 ha), Ceahlău (2.04/0.81 ha), Pipirig (0.51 ha/-), Hangu (1.5/0.93 ha), Tazlău (1.075/0.15 ha), Grințies (2.4/0.85 ha), Tarcău (1.125 /0.05 ha), Piatra Șoimului (1/0.51 ha).

In the subcarpathian Bistrița valley, significant differences were recorded in case of Dumbrava Roșie (4.5 /0.12 ha), Săvinești (2/0.5 ha), Zănești (5 /0.14 ha) communes and the same patterns are encountered also in floodplain of Siret river in the proximity of the Tamaseni commune (4/0.28 ha) or floodplain of the Moldova river in case of Cordun commune (2/0.59 ha). Almost constant values were recorded in the villages located on the terraces of Moldova where such dumpsites are furthest from the river as Botești (1.03/1.3 ha) and Gherăeşti (0.28/0.29 ha). These major differences observed in the comparative analysis contributes also the closure of these sites (between the two inventories taken by the authorities, the legal term until 16 July 2009), on the other hand, depends on the accuracy of the data reported by local authorities. In any case, these aspects cannot minimize the potential role of flash floods on these sites where waste dumping still prevails in these areas (2010-2011) as confirmed by field observation. It should be noted that in both inventories there were several communes / villages who did not report such sites on their territory, although rural population access to WCS was only 15.14% in 2009.

4. Conclusions

Statistic analysis of rural dumpsites parameters cannot claim to be exhaustive, but outlines the role of geographical conditions in their spatial distribution in a multi-scale context (counties – communes – villages). Rural dumpsites were the heritage of poor waste management facilities from pre-accession period until 16 July 2009 when these sites should be closed according to Government Decision nr. 345/2005. Nevertheless, these improper sites are also encountered in now days due to low coverage of WCS from several rural regions of Romania. Geographical implications at local and regional scale are outlined by thematic cartography and GIS techniques. These are useful tools in order to assess complex interactions between environmental- waste management- human settlements in a multiscalar context, such as villages – communes – counties – development regions – countries – EU. Geography of waste is emerging under the multi and interdisciplinary approaches of waste management sector.

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Carte, potere e identità nazionale. Il *Leo Belgicus* come simbolo dell'indipendenza delle Province Unite

Maps, Power and National Identity. The Leo Belgicus as a Symbol of the Independence of the United Provinces

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Riassunto

Durante l'ascesa delle Province Unite, tra il XVI e il XVII secolo, la realtà geografica olandese cominciò a essere rappresenta nella forma di un leone, da storici e cartografi. Quello che è conosciuto come Leo Belgicus ha simbolicamente rappresentato alcuni passaggi fondamentali della storia olandese nel suo "Secolo d'Oro", come metafora visuale di una identità nazionale in formazione, della lotta contro l'elemento acquatico, della rivolta contro la Spagna imperiale e, inoltre, come simbolo delle metafore di ricchezza acquisita proprio con l'indipendenza nazionale. Durante un periodo di studio ad Amsterdam per il dottorato di ricerca, ho avuto occasione di analizzare alcune mappe raffiguranti il Leo Belgicus (studiate solo parzialmente fino ad ora), dalle quali alcuni segni allegorici apparivano chiaramente: si è provato così a collegarli con l'evoluzione della storia olandese e con alcune immagini dell'identità nazionale che emersero in quel periodo "d'oro".

Parole chiave

Cartografia simbolica, Cartografia critica, Carte per l'identità nazionale, guerra d'indipendenza olandese, Secolo d'oro olandese

Abstract

During the rise of the United Provinces, between XVI and XVII centuries, the geographical reality of the Netherlands started to be represented as a lion by historians and mapmakers. The so-called Leo Belgicus symbolically characterized some important steps of the Dutch history in its Golden Age, as a visual metaphor of a rising national identity, of the struggle against the water, of the revolt against the Imperial Spain and finally as collector of metaphors of the richness acquired with the national independence. During a period of study in Amsterdam, I was able to critically analyse some of the Leo Belgicus maps (only partially studied until now), from which some interesting allegoric elements clearly appeared: I tried to connect them with the evolution of Dutch history and with the image of a national identity which was emerging in that «Golden» period.

Keywords

Symbolic Cartography, Critical Cartography, Maps for National Identity, Dutch Independence War, Dutch Golden Age

1. Introduction

Maps have often been a vehicle of power for European monarchs, especially during the Early modern period (Branch, 2014; Kagan and Schmidt, 2007), legitimating the power of national states forming – and then stabilized – in the political, economic and social European theatre (see Leti, 1690), particularly between the 16th and 17th centuries. Already in earlier times, the cartographic production coincided with an accurate image of the world with purposes from time to time different, but from the end of the Middle Ages the connections between cartographic representations and dynamics, intentions and political demands necessarily grew stronger. These relationships took place in the context of the birth of nation states, which – as such and by definition – exercised their power within a territory defined by specific boundaries and with a certain population. The combination of these latter elements – the territorial knowledge of the boundaries delimiting a power and the population on which this power was exercised – put geography and the production of maps at the centre of several dynamics of territorial conquests and national claims (see Salvatori, Ricci, 2015; Raffestin, 2012; Buisseret, 1992). As David Buisseret rightly pointed out at this purpose «the great expansion in mapping activity seems to go back to the later sixteenth century, when, particularly in England and the Low Countries, landowners began commissioning "estate plans" to help them manage their holdings» (Buisseret, 1992, p. 1).

Among these, it is emblematic the Dutch case in its cartographic (Sutton, 2015) – and not only – Golden Age (AA.VV., 2007) and the symbolism of the Leo Belgicus, connected with crucially important passages of Dutch history (von Zesen, 1660). Since not many studies have been conducted on these themes (see Tooley, 1963; van der Heijden, 2006), without giving a wide frame of the political, social and cultural contexts in which the Leo Belgicus maps have been produced, I propose a recognition of some examples of those maps, analyzing their historical, cultural and political significance, putting them in a new light, in relation to the history and development of the national identity.

The critical cartography – as in the studies of Harley – appears to be the best methodological approach to connect the signs present in those maps to their original – both cultural and historical – messages. This study does not want to be only a philological reconstruction of the map, but aims at giving even a theoretical contribute to the critical reading of the maps, starting from a first example.

The Leo Belgicus is a zoomorphic cartographic representation that reproduces the geographical and political reality of the Netherlands, primarily between the 16th and the 17th century, as a lion. The goal was often to connect the requests for independence from the Spanish power with the entire geographic – and therefore social – reality of the Netherlands of the time. As noted by Kagan and Schmidt, «more forthrightly, the multiple versions of the famous Leo Belgicus maps announced the political arrival of the Dutch Republic in the form of a heraldic lion superimposed on the outlines of the seven now-liberated provinces of the north» (Kagan and Schmidt, 1992, p. 674) and, for his part, Ton Hoenselaars noted that «the phenomenon of the *Leo Belgicus* is of interest for several reasons. Firstly, it signals an early-modern nation, without natural borders on all sides, in an attempt to capture and visualize its territorial shape. Secondly, the *Leo Belgicus* that emerges demonstrably represents not only the nation, but an *image* of the nation» (Hoenselaars, 1993, p. 96). Three different typologies of cartographic representations of the Leo Belgicus were first identified by Tooley (1963) and then resumed, in a more recent itemized but quite exhaustive study by van der Heijden (2006): the first typology is the one proposed by Michael von Aitzing in 1583 and then repeated by many others, and sees the lion facing right; the second one, developed by Janzsoon-Visscher, shows the lion walking to the left; finally, there is the Leo Hollandicus, developed by Visscher in 1633, which represents the secessionist symbolic seal of the Republic of the United Provinces.

My first question – which have not yet been faced in detail in the existing literature – is: what kind of message is hidden in the analyzed maps? What society has produced those representations? Is there a strict connection with the politic dynamics of that time?

I will attempt to highlight the historical testimonies of some maps that I were able to examine in Amsterdam, particularly illustrative of the relationship be-

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tween secessionist developments and geographical situation, with symbolic references that I will try to put in direct correlation with political dynamics, economic and commercial developments of the time and – where present – with religious references.

2. Birth and early development of the idea of Leo Belgicus

The idea of representing the Netherlands in the shape of a lion, as said above, came from Michael Atzinger called «the Austrian» (Michaele Aitsingero Austriaco), at the end of the 16th century. Native from Obereitzing, born in 1530, von Aitzing was astronomer, geographer and scholar of languages and mathematics. After the academic studies carried out in Vienna, for about forty years he got closely in contact with the reality of the Netherlands, Holland and Northern France, travelling across them. In 1583 he composed a work (Aitzing, 1583), now available at the University of Amsterdam, of more than 520 pages, in which the Dutch history from 1509 to 1583 is told not only through words and tables describing the key moments, but also through very evocative engravings, very well summed up to the written part. In the updated reprint of two years later, a copy of which is present in the same University, the map with the Leo Belgicus[1] is included.

Why von Aitzing started this particular and very evocative depiction in a moment like that of 1583, in which the United Provinces had already moved the first but important steps towards the independence that they will finally reach with the Peace of Westphalia in 1648? Because, while maintaining a constant reference to the Spanish domination and to the emperor, utterly hailed in the introduction («cum privilegio caesareo»), in 1579 the seven northern Provinces of the Netherlands declared their independence, constituting a first hint of the State then formalized with the Peace of Westphalia. This assimilation of the lion to the Dutch configuration is due to the amount of lions present in the coats of arms of the Netherlands provinces: of 17 provinces reported by von Aitzing in the 1585 map, 13 have coats of arms on which lions are depicted. As well outlined by Ralph Ehrenberg «apparently Aitzinger chose the lion motif because most of the provincial shields or coats of arms of the provinces depicted a lion» (Ehrenberg, 2006, p. 112).

The intention of the author, as explained in the introduction to the map in the upper right corner, is a historical and geographical neutral analysis, in order to give the reader as much as an objective, accurate and clear historical overview of the seventeen provinces of the Netherlands[2], from 1559 to 1583 (in later editions, it will then be updated). In the introduction to the reader of the book, however, although openly declaring its catholicity, von Aitzing clarifies even better the terms and reasons of his choice: that is to put in close correlation – graphical and historical at the same time – the figure of the lion to the morphology and the borders of the Netherlands, while remaining in a field of substantial neutrality and impartiality with respect to partisan positions in favour of the Empire and of the anti-Spanish riots already triggered at that time in some Netherlands provinces. This is achieved by starting from the analysis of other great writers of the past and mentioning the statements of the most important men in some way related to «Belgium»: Atzinger quotes Lodovico Guicciardini who, in his *Descrittione di tutti i Paesi Bassi, altrimenti detti Germania Inferiore* (Guicciardini, 1567), spoke about the absence of fear of the lion, which fearlessly tackles all, proving how it «is the strongest among all the beasts»; he recalls the *Commentarii* of Julius Caesar (1547), in which it is stated that

1 In the image reported by van der Heijden (2006) there seems to be a typo, since at the date of my personal consultation – August 2013 – in the 1583 copy mentioned by him there is no map, while it is present in that of 1585. It might been stolen in these recent years (from 2006 to 2013) or, more likely, it could be an error of the author: from some almost unequivocal details, clearly observable in person, the map of 1583 that he cites seems to be in effect just the one of 1585.

2 «I promise that I will always be none other [than Catholic], by the grace of God, but Catholics shall not expect for this reason that in this book I want to infringe the men of a contrary religion (with those, enough happened from the fathers of the Council of Trent, and I don't want to be a theologian of my religion). The happy reader will be aware that I am undertaking just a topographic and historical description of the Belgian lion in the same book and in that way I accomplish it, and in the introduction of the map of the Lion, I promised to the reader that I will continue», von Aitzinger (1583), *lectorem prefatio* (translation of the author).

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FIGURE 1 – The Leo Belgicus as seen in von Aitzing's *De Leone Belgico* (1583)

the Belgians are the strongest of all[3]; and finally he reports the statements of Charles V, who had thought of naming those regions as «the kingdom of lions»[4]. For this reason, and for the coincidence that sees a lion on almost every coats of arms of the Dutch provinces, as well as the morphological evidence of similarity with the animal, the author's choice fell on the symbol of the lion, which will become – precisely – the «Leo Belgicus»: every part of the «Germania Inferior», according to

3 «I actually consider the sentence of the wise Solomon, who says that the lion does not have fear of anyone, but is the strongest of beasts; also from the commentaries of Julius Caesar I observe that the Belgians are the strongest of all: not without reason it seemed to me appropriate to apply to Belgium the shape of the lion», von Aitzinger (1583), lectorem prefatio (translation of the author).

4 «The Emperor Charles the Fifth of praiseworthy memory and name, once in the verge of paying homage to the Belgium with the high honours of the kingdom, decided that it should be named the kingdom of lions; maybe that's why all or most of those provinces are indicated by lions. For this reason, as well as of first intuition, you may not only see the whole lower Germany in the form of an entire lion, but also the individual parts of regions, in the shape of the same lion; diligently elaborated» (*Idem*, translation of the author).

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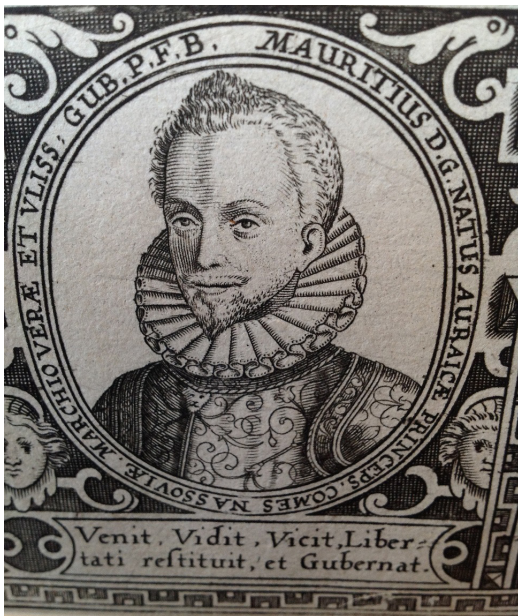
Figures 2-3
Van Doetecum, *Leo Belgicus* (1598)
and the detail of Maurice of Orange-Nassau

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the Austrian, can be seen and interpreted as part of an organism, «limbs of the same lion», thanks to the ability of Frans Hogenberg, author of the first of these maps.

The aim was to remain faithful to facts and truth, perfectly integrating the history of that last few years, of that land and that people. The Leo Belgicus maps have represented, in this direction, a perfect example of integration of history and cartographic representation: they reproduced the Netherlands in the zoomorphic image of a lion, symbolizing the different and signifying steps of the construction of the national identity through the signs, the faces and attitudes that the lions assumed in the several considered maps.

In the case just considered, therefore, a coincidence of the element of the lion with secessionist ambitions or references to the revolt against the Spanish Empire is absent. This is clear both from the statements, already referred, of the absolute neutrality of the author, and from his open admission of Catholicism. The only point was to mention the brave nature of the Dutch, that will be a determining factor in the long war of the small regions against the Spanish Empire (see Israel, 1995). It was one of the bloodiest periods of the war, with the attempts of Philip II, through the action of the Duke of Parma, Alessandro Farnese and the Duke of Alba, Fernando Álvarez de Toledo, still remembered as a sort of monster, equated with the «boogie man» in the Dutch provinces (Kamen, 2004), to bring under its control the Southern regions, succeeding only at the cost of tens of thousands of dead[5] and about one hundred (maybe even one hundred and fifty) thousand emigrants from south to north, with a peak in 1587 (Israel, 1995, p. 308). In 1585, the year – perhaps not coincidentally – of the second edition of the *De Leone Belgico* by von Aitzing, Oldenbarnevelt became Pensionary of Holland, assuming a leading role that will be essential to achieve the independence of the seven Provinces of the North.

5 The only Antwerp went from 84000 inhabitants in 1583 to 55 thousand in 1585, after the siege, up to the 42 thousand of 1589, Israel (1995), p. 308.

3. The Leo Belgicus and the rise of the Netherlands

In the intermediate steps in the history of the symbol of Leo Belgicus it is possible to catch a glimpse of some interesting similarities with the history of the rising Republic and especially with the claims of freedom from imperial domination, until the last phase of this symbolism, which will be represented by the Leo Hollandicus, in a transformation not only nominal, but concerning the very spirit of the maps and their more intrinsic meaning. The second example of Leo Belgicus is also reported by von Aitzing, in another of his works (von Aitzing, 1584), while Van Doetecum, in 1598 – year of the death of Philip II – shows the Leo Belgicus surrounded by portraits of the Netherlands rulers, starting from Philip II, clearly distancing, even here, from any pro-revolt partisanship. In this map, that I was able to study at the library of the Rijksmuseum, an explicit stance is absent, as the inscription reported on the upper right[6] refers to the governors of both parts of Belgium during its history, depicted on the left and right sides, while at the bottom, between the two writings (in Dutch and French), are reported the faces and descriptions of the *stadtholder*, who essentially held the military power of the Republic, having the command of the armed forces and being admirals of the fleet.

Interestingly, however, the Latin inscription placed under the image of Maurice of Orange-Nassau reports: «Venit, Vidit, Vicit, Libertati restituit, et gubernat». In the analysis of this map is important and useful to connect this mentioned inscription to the historical facts that we would like to mention here, for a better understanding of it. The same Maurice of Orange-Nassau defined the map of the future Republic at the end of the 16th century, realizing that partition between Provinces of North and South that will mark the life of the Netherlands in the later stages; partition that this map, as recalled by van der Hijden, emphasizes in many of its elements (Hijden, 2006, p. 35). The sentence mentioned above, which notes – once again – Julius Caesar's *De Bello Gallico*, concludes pointing out that Maurice restored freedom

6 «[...] accesserunt icones gobernatorum generaliu qui utrimque belgium gobernarunt».

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and ruled the Netherlands, giving a role of preeminent historical importance to the *stadtholder* of the Orange-Nassau dynasty. I will now attempt to mention the main merits of Maurice and how he came to the restoration of Dutch freedom and to the government of the provinces, which is well highlighted in this map.

Only eight years before the drawing of this map, Maurice of Orange – one of the most important exponents of the extremist «party» in the debate within the provinces – had completed an extraordinary strengthening of the armed forces of the young Republic[7]. Under his command and thanks to this renewed military capability, from 1590, the Dutch forces managed to wrest from the Spaniards a big part of five provinces (Gelderland, Overijssel, Drenthe, Groningen and the northern part of Brabant) and to conquer forty-three cities. With a quick attack, made of fast movements and new methods of siege, Mauritius managed to conquer the IJssel, to take the city of Zutphen, Deventer and then some Spanish forts (including Delfzijl and the strategic Ems estuary), the city of Groningen[8], Hulst in Flanders and Nijmegen, thus obtaining control of several important rivers and restarting the commerce with the German cities. The second major offensive came at the end of the century, in 1597, when Maurice, thanks to the new acquired positions, decided to launch a new attack against the Spanish forces: the first target was the strategic town of Rheinberg, literally considered the «whore of war» (Israel, 1990, p. 35), because it was used by the enemies as a foothold on the Rhine. Thanks to the efficiency of transport and to the fast moving artillery, Mauritius managed to complete the conquest of the eastern Netherlands. Between 1590 and 1597 the Dutch Republic had shown great military capabilities and from a small rebel region had become a major military power, the second in Europe only after Spain[9], and the Spanish domination itself was trying, in some way, to re-establish the national sovereignty. Philip II, now at the end of its mandate and in the process of dying, gave the remaining areas under its jurisdiction (the southern part, with the city of Brussels) to his daughter Isabella and her husband, the Archduke Albert of Habsburg (that will be mentioned later in another cartographic representation, as we will see).

The map of the Netherlands was therefore again re-designed: the Dutch forces had in hand, at the turn of the 16th and 17th centuries, a big part of the northern Netherlands, while the Spanish troops occupied the territories of the south, including Brabant and Flanders. In substance, Mauritius of Orange Nassau had won and ruled at the time, as stated in the map. Another prominent example of Leo Belgicus is provided in 1617 by Petrus Kaerius, which has developed a map produced by Hendrik Floris van Langren before 1609, with the lion turned to the right and on the basis of the Leo Belgicus provided by von Aitzing, to which he pays personal homage, but with the particular addition of the description of the people and their traditional costumes on the lower right and left, already present in that of van Langren.

4. The Leo Belgicus in the Twelve Years' Truce

Among the other typologies of Leo Belgicus, the one made by Claes Jansz. Visscher should be mentioned, the dating of which is not certain, because not explicit (but

7 If in 1588 the military machine had 20 thousand men, seven years later it came to more than 32 thousand units, not to mention the technical developments in transport methods and in the artillery, Israel (1995), p. 242.

8 With a quick attack, made of fast movements and new methods of siege, Maurice managed to conquer the IJssel, to take the city of Zutphen, Deventer and then some Spanish forts (including Delfzijl and the strategic Ems estuary), the town of Hulst in Flanders and Nijmegen, thus obtaining control of several important rivers, as well as jump-start the trade with the German cities. In 1593, with the death of 400 Republicans soldiers and 300 other pro-monarchist with a total of 10 thousand cannon balls shot, the fall of Groningen was inevitable: the Catholic religion was definitively banned and the clergy and people were forced to escape to the south, see Israel (1995), p. 248. The second major offensive came at the end of the century: in 1597, thanks to the new positions, Maurice decided to launch a new attack against the Spanish and the first target was the strategic town of Rheinberg, considered literally the «whore of war», because it served to enemies as a foothold on the Rhine.

9 The Dutch Republic, not surprisingly, was one of the first to be able to better interpret the spirit of the military Revolution introduced in Italy in the fifteenth century and culminating with the adoption of the uniforms under Louis XIV. The innovations expressed by the Dutch army – in the allocation of the soldiers and in the use of new techniques – reflect the peculiarity of the wars undertaken by the Dutch and the territory of the Netherlands. On this subject, see Israel (1995), pp. 267 et seq.

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FIGURE 4 – Claes Janzs. Visscher, *Leo Belgicus* (1611 ca.)

certainly between 1609 and 1621, the years of the Truce, and it is not excluded that it may have been produced in 1611[10]), in memory of the stalemate in the conflict between the Imperial Spain and the United Provinces. The negotiations for the signing of the Truce lasted about two years and had therefore led to develop the consciousness of the population: the symbolic references in this map are therefore countless and it is well worth to report some of the most important, all referring to the celebration of the Truce which had been established and was one of the essential drivers for the political and economic development of Netherlands.

10 At this purpose, Schilder notes that it could be published in 1611, because in the map the imprint «gives Visscher's address as *inde Calverstraet*, where he lived from 1611 onwards», Schilder (2000), p. 254.

In the map, the image of Leo Belgicus is associated to several allegorical figures and highly symbolic images, all aimed at exalting the idle time of the war and the prosperity that ensued. First, however, it should be mentioned the richness of details present in the map, the precision of the topographical description and the high value – even artistic – of the landscape descriptions, never remaining only an end in itself but always reporting an absolutely unique symbolic and descriptive reference. As rightly noted by the Italian historian Alberto Clerici, who well analyzed the historiography of this time, the Truce «represent, as a matter of fact, the "end" of the war itself, a "point of no return", because that date establishes the independence and international popularity of the Republic of the United Provinces, if not de jure certainly de facto, and consequently

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Figures 5-6 – Details of the Visscher map (1611 ca.)

the definitive secession between Northern and Southern Netherlands» (Clerici, 2009, p. 188). Alongside the political dynamics, which certainly played a prominent role in social life and in the debate within the provinces, should be considered, in parallel and in the wake of the firsts, even those of mercantile and commercial nature, that were also resolving for the decision of the Truce itself, which would have guaranteed freedom of trade in individual activity[11].

It will now be useful to examine the figures and images surrounding the lion: observing them in minute detail, they give a clear message about the Truce, with the written engravings framing them and explaining, where it is less clear, what the illustrations really want to communicate. Above the one on the right, which seems to whisper in the ear something apparently insidious (Figg. 5 and 6), the message in Dutch says «t' Neerlandt onder Aersthertogh Albertus», namely «the United Provinces under the Archduke Albert of Hapsburg». It is the allegory of the Netherlands under the control of the husband of Isabella, daughter of Philip II: they had the imperial mandate of jurisdiction over those areas, thus representing the counterpart of Maurice of Orange-Nassau, intent to insidiously deceive the other Holland, which seems almost immovable, firm on its position. This figure appear proud and triumphant on the map, with the words «t' Vrÿe Neerlant» («the free Netherlands») marked on the right shin: the representation of the Netherlands liberated from foreign domination and that cannot be fooled by the governors sent by the Spanish emperor. And with this look of pride and domination, the same leg of the

11 This argument is reflected in some of the articles of Truce, but the eighth note specifies that: «similarly, merchants, captains, pilots, sailors and their ships, merchandise and other property belonging to them will cannot be abducted and detained, neither by virtue of any general or specific mandate, nor for any cause for war, or otherwise; and not even under the pretext of wanting to use it for conservation and defence of the country», Art. 8, Giustiniano (1609), p. 318.

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FIGURES 7-8 – More details from the *Leo Belgicus* by Visscher (1611 ca.)

«free Netherlands» even crush the «old discord» («d'Oude Twist»), an evil figure who succumbs under the weight of new State, free from the constraints of war and foreign sovereignty. The new Netherlands, therefore, not listening to «the United Provinces under the Archduke Albert of Habsburg», with their action succeed in the destruction of the old discord.

The lion, on his behalf, facing right, holds a sword pointing downwards, as a sign of military harmlessness, and two small medals dangles from the handle of the sword, with two highly symbolic inscriptions on them: «Voor Twalef Jaren» is written on the first, which means «For twelve years», clearly referring to the Truce, and the other presents the same sentence given in Latin, indicating that the Truce was valid for both sides, the Dutch (for which the inscription is reported in vernacular) and the imperial (with the inscription in Latin, of course). Around the sword are three figures of soldiers (fig. 7). Two are smaller and on their back, representing, as marked beside them, the «Frontier Wacht», namely the «border guards». The other figure (Fig. 8) is a soldier absolutely harmless, faceless, sleeping leaning on a cannon with the shield on the ground, holding his spear under his arm, using it just as a means of comfortable support. It is the allegory of the «Slapende Oorlogh» (the «sleeping war»), by virtue of the established Truce, declaring the «cessatione di tutti atti d'hostilità di qualsivoglia modo che si sia tra li sopradetti Rè, Arciduchi, e Stati Generali, così per mare & altre acque, come per terra, in tutti li loro Regni, paesi, terre e Signorie, e per tutti lor Vassalli e habitatori de' lor paesi, di qualsivoglia qualità e conditione che si siano, senza eccettione de luoghi ne di persone»[12], which means the «end of all acts of hostility of any kind between the King, Archdukes and the States-General, both by sea and other waters and by ground, in all of their kingdoms, coun-

12 Art. 2, Giustiniano (1609), p. 315.

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tries, lands and lordships, and for all of their vassals and inhabitants of their lands, of any quality and condition, without exception of places and individuals». The part of the treat which is more inherent with the images that we are referring to, concerning the state borders, is the art. 3 and reads as follows: «ciascheduno possiederà, e goderà effettivamente de' paesi, ville, piazze, terre e Signorie, che tiene e possiede al presente, senza esserne turbati ne inquietati in essi in qualsivoglia modo che si sia durante detta tregua, in che s'intendono compresi li borghi, villaggi, case, & campagne rase che da quelli dependono»[13]: «Everyone will possess and will effectively benefit from the countries, villas, squares, lands and lordships which owns and holds at the present, including hamlets, villages, houses and lands depending on them, without being disturbed or unsettled within them in any way during the Truce».

In the upper right corner of the map we can see a cherub playing a trumpet, which produces the double inscription (again, in Latin and Dutch, in the latter case entering the mouth of the lion, fig. 10), «the Twelve Years' Truce» («Bestant voor 12 Jaer» and «Treve 12 ann»), while on the other side, on the left, another cherub empties a sack with gifts falling like a waterfall on the landscape of a Dutch city, signifying the beginning of the prosperity originating from the Truce. In addition to the falling gifts, some writings in Dutch emphasize the intrinsic meaning: first, almost propelling the action of the cherub, the word «Zeghen», which means «blessing», significantly a little bigger than the others. Then, starting from the top, the inscription «Const en Wetenschap» stands out, which can be translated as «arts(s) and science(s)», next to which there are an astrolabe and other navigation tools. Beside an hourglass, we can find the inscription «vailighe tijdt», which means «safe (or secure) time». Other gifts include a book, which represents the «knowledge of God» («kennisse goodts», just below the image), coins and goblets, representing the «Rijkdom», the «wealth», precisely deriving from the cherub and the Truce itself.

Above the angelic figure, in the form of a sun radiating on the action of Leo Belgicus and therefore of Holland itself, lies the word «God», providing, by means of the angel, all the above mentioned tributes to the young Republic, as a manifestation of divine blessing and approval, representing the symbolic elements of a wealth never known before in Holland, that will lead it to its heyday during the 17th century, precisely at the peak of the Dutch Golden Age. The gifts are therefore given by the Providence, by the blessing of God expressed through the cherub, symbol of purity, tossing to the Dutch cities the signs of future prosperity resulting from the Truce with Imperial Spain. Even on the Dutch city represented by Visscher inscriptions are reported, telling the feeling of optimism and exuberance that permeates the entire map: in the upper right of the perspective view the inscription says «t' Lants Welvaert», which means «the lands of prosperity»; below a city gate under construction the engraving says instead «t' Vergrooten der Steden», which means «the extension of the town», just to underline the idea of Dutch progress and incredible urban propulsion at the time. A little more to the right, to mark the action of men ready to embark freight on the boat moored at sea, the word «Coophandel», meaning «the», which was one of the three «pillars» on which the Truce itself rested, in addition to the political freedom of the United Provinces and the «juridical» issues. In the internal disputes, among the different positions, also intervened Hugo Grotius, that in the Mare Liberum «did not exclude the possibility of making peace or war with Madrid, but only on the condition that Spain conceded total freedom of trade to the Dutch in the Indies» (otherwise, it would have been preferable to continue the hostilities: Clerici, 2009, p. 189): issues partially addressed in the Truce which, as seen above, provided for broad freedom of movements for the traders in carrying out their activities while regulating, in essence, with the Art. 12, the piratical and racing activities.

In this regard, to mark the element of pacification between the two countries and to freeze any discord, the text of the Truce, at the Art. 4, specifies that: «Gli sudditi & habitanti ne' paesi delli sopradetti Rè & Arciduchi, e delli Stati, haveranno e teniranno fra di loro ogni buona corrispondenza & amicitia durante detta tregua, senza far riferimento delle offese e danni ricevuti per lo passato e potranno etiando frequentar' e residere ne' paesi l'uni dell'altri» (Giustiniano, 1609, p. 320): «The subjects and inhabitants in the countries of

13 Art. 3, Giustiniano (1609), pp. 315-316.

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FIGURES 9-10
The gifts brought by the cherub and the prosperity of the urban Dutch landscape in Visscher map (1611 ca.)

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the aforesaid King and Archdukes and of the States will have every good mutual relationship during the Truce, without reference to the offenses and damages received in the past, and they will be able to visit and reside in each other countries». Further down, near a cultivated land cultured by peasants[14], the inscription says «t' Vredich Lantbouwen», meaning a «peaceful building land», and on the road leading to all this there is the inscription «t' Veÿlich Reylch», which presumably can be interpreted as «the safe riding» or «journey»: this idea of security concerning also the traffics and the trade is also found in the art. 4 of the Truce, which states that the citizens of both countries will be able to «practice their traffic and trade with absolute safety, both by sea and other waters and by land [...]» (Giustiniano, 1609, p. 320). On the other side of the map, close to grazing animals, the inscription «t' Overloedich Vee» seals such security, meaning «the abundant cattle», additional element of extreme vitality of the Dutch living, possible thanks to the Truce. Holland, in this perspective, represent all the positive things that can be found and given to man by nature, thanks to the divine will and to the possibility of prosperity that the Truce was giving to the citizens of the young Republic: a positivity expressed in the security of a country where the abundance would characterize the present moment and their immediate future.

Every symbolic element present on the map refers to that extremely positive and optimistic vision, which evidently permeated Dutch society at the time of the stipulation. With its 38 articles, its secret statement and the twelve-years forecast of armistice, the Truce was absolutely advantageous for the United Provinces, both from the political point of view and from the economical and trading aspects: «the opening article concerns the problem of sovereignty, while the secret final statement solves the issue of oceanic traffics», and the United Provinces had «all their demands recognized, without allowing the freedom of worship for Catholics (except in the newly conquered Southern areas), through a skilful balance of intransigence – sometimes almost arrogance – and calculated acquiescence» (Clerici, 2009, p. 190). The comment of the time by Giovanni Costa (1610), cited by Alberto Clerici, seems to fit perfectly, in a vision permeated by the religious, Calvinist influence, with the ideals of economic advancement, political independence and freedom of trade established by the Truce, and that the analyzed map celebrate in each of its figurative element:

> Così quietando l'armi, riposeranno gli animi di tutti. E questa pace universale, essendo particolarmente in acconcio de' Paesi bassi, potranno essi alleggieriti hormai dal peso di tante calamità, attendere a gli honesti, e soliti lor mistieri del mare, del traffico, e del campo. Et in questo numero di beni, si può aspettare, che quel popolo Holandese inspirato da Dio, e forse tra se per varie cagioni discordante, che suole essere il natural tarlo delle Repubbliche, spogliandosi a poco a poco con la pace, della fierezza militare, debba ritornare a' i primi suoi fortunati principij (Costa, 1610, pp. 44-45).

So, with weapons at rest, will rest the minds of all. And this universal peace, being particularly favourable for the Netherlands, will relieve them from the weight of so many calamities and make them able to pursue their honest and usual occupations and traffic on the sea and on the field. And with this riches, it is expectable that this Hollandaise people inspired by God, and perhaps for various causes discordant, that use to be one of the natural seeds of the Republics, gradually abandoning the military pride for peace, should return to its first lucky beginnings.

In 1630, another Leo Belgicus (*Nova XVII Provinciarum*) appears in the works of Visscher, with the lion facing left, with the North, shown in the upper part of the wind rose, turned to the right and with the symbol of the Dutch East India Company (VOC) in the upper right. It is interesting here to see how some elements that characterize the Dutch society of the time are incorporated, in a map where the nautical element is predominant: two writings are the caption for the images of boats and harbours («Currus veliferi septem miliaria conficientes unius hora spatio» and «scapha per glaciem navigans incredibili celeritate»), to underline the importance of the «water factor» in the life and development of the Dutch Republic (Boxer, 1965; Davids, 2012).

14 This was a relatively recent operation for the Dutch, who had begun to cultivate the land with regularity only as a result of land reclamations, mainly accomplished between the mid-sixteenth and mid-seventeenth century, see Ciriacono (1994).

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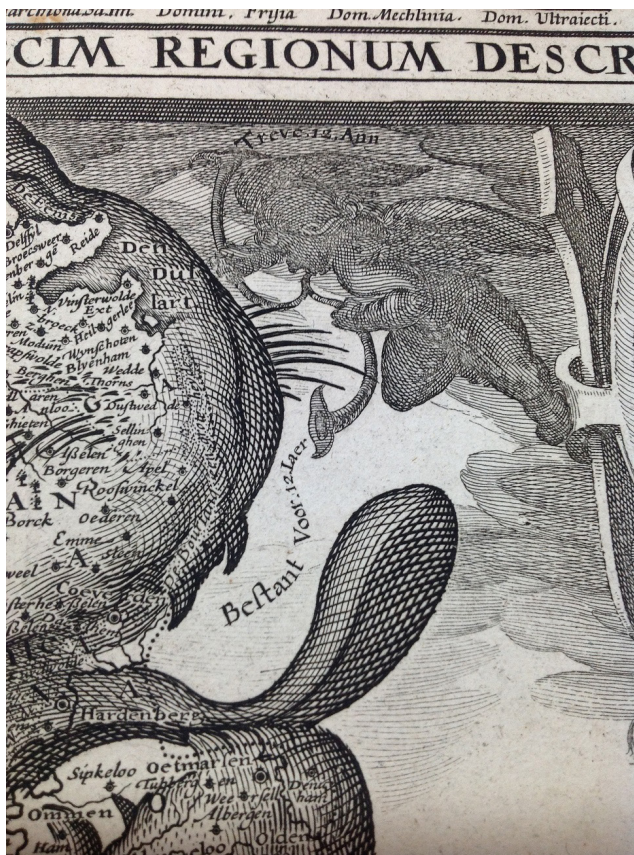
FIGURES 11-12
Other symbolic elements present in the Visscher map (1611 ca.)

5. The Leo Hollandicus and the Peace of Westphalia

From our analytical perspective, among the most interesting maps produced by Nicolaes Ioannis Visscher, for the year of production and for its historical implications, there is that of 1648 (Fig. 12), with the Leo Hollandicus – Hollandicus this time, no more Belgicus in the broadest sense – facing right, holding the sword with an aggressive look on his face, no more harmlessly – as in the map celebrating the Twelve Years' Truce – but ready to strike. On the same weapon are written the words «patria defensio», that is «[in] defence of the homeland», meaning the Dutch determination and courage in defending its independence, gained by force, after decades of rebellion. It was a Hollandicus Lion, because a full national identity was acquired, based on the centrality of the Holland Province, in which the other ones recognized the most authority, derived mostly from the commercial activity and based on the political weight in the States General[15]. In the year 1648, the Peace of Westphalia had just been signed and the United Provinces were officially recognized as a separate and independent political entity, after eighty years of war with Spain, with the pause of the Truce for twelve. This map has a meaning and a symbolic value which therefore differs from that analyzed above, where the celebratory element was the moment of the Truce reached between the two countries at odds: here, in 1648, the zoomor-

15 «After the Dutch Revolt it was Holland's military personnel and economic resources that helped sustain the Republic's autonomy. The States General became more instrumental in Dutch government», Frampton (2006), p. 53.

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FIGURE 13 – Visscher – t' Graesschap Hollandt (1648)

phic figure wants to express the attainment of the state autonomy as opposed to the foreign domination, with a vigorous lion, strong in its new position, in the years of great economic prosperity and political independence.

The map celebrates this event, also in this case, with evident symbolic references. In the upper part, on the margin of the map, the Dutch citizens in their traditional costumes are represented: aristocrats, merchants and the farmers of the South and the North. On the sides, the views of the major cities and on the lower part, a few coats of arms. In the upper centre, the inscription «t' Graesschap Hollandt», namely «the county of Holland», to emphasize the national dimension now assumed by the United Provinces, recognizing themselves in the most powerful and influential region among them, Holland. To illuminate the action of the Leo Hollandicus, in the upper centre, is the Hebrew tetragrammaton, assimilated to the sun, representing God, the unnameable in the Jewish religion. In this case, unlike the previous one, the words are no longer in Dutch, but in Hebrew, and the closeness of feelings with that people – also saved from the waters – seems obvious: the historical coincidences claimed by the Dutch themselves seem undeniable, in a clear Calvinist vision of their national history (Po-Chia Hsia and Van Nierop, 2002; Berkvens-Stevelinck, Israel and Posthumus Meyjes, 1997).

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The action of war and homeland defence of the Dutch people, assimilated to the Jewish – perhaps precisely for the salvation from the water – is essentially blessed by God, and it is a blessing that legitimate independence from foreign sovereign, embodying the devil. As stated by Simon Schama, «in the Calvinist mentality, the eventual messianic chronicle *could only* be comprehended by the history of the Jews, through whom the Almighty had worked his will» (Schama, 1988, p. 95) and this mentality strengthened itself «as a national culture». Basically, in their Calvinist and messianic vision, the Dutch were only performing a secular function, with total respect for the will of God, interpreting the divine light in earthly things and in their own struggle for independence, concluded with success in the Peace of Westphalia of 1648, celebrated in this work. Even the wealth hoarded during those years, especially in Amsterdam, was part of the same divine plan: «The Great and Almighty Lord has raised this city above all others... yea he has even taken from them the shipping of the east and the western [...] and has spilled their treasure in our bosom» (Schama, 1988, p. 300). The security of success on Earth, according to the logic of double predestination, which could obviously be applied not only to the personal, but also to the national level, was both an omen of divine vicinity, and, much more, a guarantee proved and certified of the predilection of God for the nation or the person. According to this perspective, the independence of 1648 was therefore wanted by God, who had guided the Dutch actions until the final success and obtainment of autonomy from the Spanish and Catholic Empire.

6. Conclusions

The symbolism of the Leo Belgicus, then transformed into Leo Hollandicus, within the resurgence of the United Provinces liberated from external powers, was perpetuated in the years to come, having an echo and a primary importance at the key moments in Dutch history. It is absolutely not by chance, as we have noted, that precisely for the Twelve Years' Truce and for the Peace of 1648 these milestones – of absolute importance in Dutch history – were celebrated with maps reproducing the Leo Belgicus (or Hollandicus) full of symbolism and important allegorical references. In light of what was said, these analysis can lead to read the Leo Belgicus, proposed especially in the seventeenth-century maps, as an important element in building a common sense of national belonging, in the birth – without wanting to exaggerate – of a Dutch identity, forged in the anti-imperial struggle, in the water management and in the development, also international, of trade (Israel, 1990); all in consideration of what this type of map has been able to express, not only in merely functional terms, but mostly symbolic, and in terms of creation of national feelings. The intrinsic bond with the historical dynamics appears most evident in the cases mentioned above, and it is of paramount importance also the coincidence of other factors: the religious, economic, social, political, geographical conformation, which are well observed and displayed in the maps here analyzed. In addition to these analogical elements, it is still unclear if, as claimed by Edoardo Boria (2012), the lion has a specific meaning also in the orientation of the maps (and therefore in the direction of the muzzle, against Spain or other enemies), or if instead it is a secondary data, that can be interpreted in different ways depending on the – even arbitrary – angle given to the reading of the map. Between this further references to clarify, there is also the even smaller «coincidence», highlighted by Michele Castelnovi, which sees the «tail» of the lion facing England in many cases, wanting to mock – and not in a veiled way – the direct competitors in the North Sea... In this way, the lion shown on the maps is assimilated to the political reality that the United Provinces were living in key moments: it is not only a strictly geographical representation, but, in a much broader vision, an allegory of the historical reality in which, in the interstices of interpretation left open by the maps, have been incorporated symbolic elements of enormous scope, such as to condition and directly influence the reader – or the owner – of the map, thus acting directly on the possibilities of interpretation and communication of the cartographic representation. Because, as Vladimiro Valerio has very well outlined, «maps, as said and reaffirmed many times, are not vehicle only a geographical message, through a construction more or less correct, but they are even propaganda or report, as

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seen, or they can be reporter of other contents which concern politics, economics, didactic, or social instances and even utopian projects» (2014). Those symbolisms of extraordinary immediacy and cultural, historical, social and interpretative scope, which we have analyzed above, especially on the maps celebrating the Twelve Years' Truce and the Peace of Westphalia, seem to be the ones that Emanuela Casti has defined «bizarre [...] aspects which may be present in a map», which «are not negligible, in terms of information, such as aesthetic elements and therefore unnecessary and/or random; on the contrary, it should be taken as clues referring to a particular conception of the world» (Casti, 2013, pp. 18-19). Such a conception of the world, going far beyond a simple representation of the Earth's surface and involving the processing of graphic and cultural symbols that are directly related to a model of society or to the celebration of a historical fact, leaning on the geographic representative – and interpretive – dimension, include within itself a participation and a strong political communicative «persuasion», also providing an economic and commercial vision and, not least, a strong religious component, which seems to organically and prominently permeate all other areas.

(All images taken by the author.)

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Il patrimonio religioso in Italia: siti web e geolocalizzazione. Un nuova valutazione[1]

Religious heritage in Italy: websites and geolocalization. A new appraisal

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Riassunto

Al giorno d'oggi la creazione, l'archiviazione, l'accessibilità, interoperabilità dei dati sul web sono sempre più pervasive. Sul web vengono pubblicate diverse tipologie di basi di dati e/o geo-database - e altre forme di informazioni fornite dalla rete – che affrontano vari argomenti (scienza, medicina, trasporti, turismo ...) e sulla base di diverse architetture. Tali banche dati possono essere private o pubbliche, con accesso gratuito o a pagamento. In ogni caso l'argomento dati è un campo continuo di riflessioni (Capineri, 2015). Un database di dimensioni significative è quello della Chiesa cattolica italiana. Si tratta di un inventario dei beni mobili o immobili su tutto il territorio italiano. Chiunque può avere interesse a questo tipo di informazioni (ad esempio istituzioni e singole persone).
Questo contributo si propone di trattare l'informazione geografica concentrandosi sui siti religiosi in un periodo in cui il turismo religioso è considerato come una risorsa importante per l'industria del turismo, per lo sviluppo regionale/locale e non solo (Rizzo, 2016). Siti web con basi di dati sul patrimonio religioso saranno oggetto di indagine al fine di capire come collegare i dati religiosi (ad esempio chiese, monasteri, luoghi di pellegrinaggio, santuari ...) con informazioni geografiche e spaziali. Le suddivisioni religiose sono diverse da quelle secolari: in Italia, ad esempio, le diocesi hanno confini diversi rispetto alle province italiane, così come le regioni ecclesiastiche sono diverse da quelle amministrative.

Abstract

Nowadays the creation, storage, accessibility, and interoperability of data on the internet are more and more pervasive. Many different kinds of databases and/or geo-databases are published on the internet, along with other forms of information that deal with various topics (e.g. science, medicine, transport and tourism), based on different architectures. These websites can be private or public, and with or without free access. However, the reflection is ongoing on these data (Capineri, 2015). A significantly-sized database is that of the Italian Catholic Church. It concerns an inventory of its movable or immovable property throughout the entire Italian territory. Anyone could be interested in accessing this kind of information (e.g. institutions and individuals).
This contribution intends to deal with geographical information focusing on the religious sites in a period in which religious tourism is considered a significant asset for the tourism industry, for regional/local development, and more (Rizzo L.S., 2016). Databases about religious heritage are investigated in order to understand how they link religious data (e.g. churches, monasteries, sites of pilgrimage, sanctuaries) with geographical and spatial information. Religious subdivisions are different from secular ones: in Italy, for example, dioceses have different boundaries than the Italian provinces, and ecclesiastical regions sometimes differ from administrative regions.

1 The contribution is a result of authors' joint work. Raffaela G. Rizzo, though, wrote sections 4.1, 4.3 and 5. Luca S. Rizzo wrote: 1, 2, 3 and 4.2. In addition, the paragraph "Conclusions" is by the two authors.

Nell'era dei big data, come viene presentato il patrimonio religioso nelle sue diverse tipologie? Qual è il livello di fruibilità delle piattaforme da parte degli utenti del web? Come si può interagire con esse? Come si possono costruire itinerari per raggiungere i punti di interesse e come si possono collegare più punti?

Parole chiave

Informazione geografica e geodati; patrimonio culturale religioso; siti web religiosi; cartografia

In the era of "big data" how are religious heritage and routes created and represented? What is the level of usability by the website users? How can they interact with such websites? Is creating itineraries to reach POIs easy? Is linkng various POIs feasable?

Keywords

Geo-information and geo-data; religious heritage; ecclesiastical websites; cartography

1. Introduction

This article is an update and expansion of the EUGEO 2013 presentation (Rizzo L.S., Rizzo R.G., 2013). After two years, the inventory of church property has greatly continued. Comparing the websites relating to the two periods (2013 and 2015) was of particular interest to appreciate the sensitivity for mapping.

Religious tourism, pilgrimages and visits to religious cultural sites increasingly contribute significantly to the dynamics of the tourist sector in Europe, and more (Trono, 2009, 2012). This is particularly relevant in Italy – a country rich in religious sites and assets (Lo Presti, Petrillo, 2010[1]). Our research aims at evaluating Italian religious heritage websites sponsored by the Conferenza Episcopale Italiana (CEI); in particular how the cartographic representation of cultural religion heritage - namely the Italian catholic church - is made available on the internet. Religious tourism in general, along with daily trips to religious sites are indeed increasing and, with them, the need to provide information to tourists/visitors about the sites they intend to visit (Rizzo L.S., Rizzo R.G., Trono, 2013; Rizzo L.S., 2016). Finding websites of travel agencies dealing with these topics is straightforward. However, they are only concerned with very few punctual heritage points or routes[2]. In addition, the World Heritage Centre now has a special interest for religious sites and their inventories. In fact, the following is highlighted: "Further to the consultation process between the World Heritage Centre and the Advisory Bodies, the elaboration of the thematic paper will be ensured in three phases: (i) preparatory activities, including regional thematic consultations; (ii) inventory, research and data analysis; (iii) consultation/production of thematic paper" (http://whc.unesco.org/en/religious-sacred-heritage).

2. Objectives of the research

The research analyses the official ecclesiastical websites and projects. This has allowed us to appreciate how clerical institutions promote themselves and, ultimately, any existing connection between these institutions and the Italian Ministry of Cultural Heritage and Activities and Tourism[3] (MiBACT) (Cardia, 2005; Latini, 2007, p. 20). In order to do so, we have focused on investigating the following:

1 Lo Presti and Petrillo (2010) in Table 1, p. 305 subdivide the ecclesiastic heritage in Italy into types of heritage "Churches, shrines, etc.": 95,000; "Monasteries": 1,500; "Sacred mountains, houses of spirituality, bishop's palace, etc.": 3,000; "Libraries": 5,500; "Archives": 100,000; "Religious museums": 936; "Artistic religious buildings": 60,653, "Pipe organ music": 12,000.

2 Especially pilgrimages.

3 See the *Intesa tra il Ministro per I Beni e le Attività Culturali e il Presidente della Conferenza Episcopale Italiana relativa alla tutela dei beni culturali di interesse religioso appartenenti a enti e istituzioni ecclesiastiche,* Roma, 26th January 2005. This agreement follows and replaces the previous one of September 13th, 1996.

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- whether the Church has datasets organized in a geo-database, or even a webGIS
- if so, how heritage site map representations are dealt with and approached.

3. Methodology of the research

Our research followed these methodological steps:
- firstly, we reviewed the existing literature concerning religious websites, inventories and religious tourism;
- we analyzed ecclesiastical projects, inventories and websites to understand the cartographic approach adopted – if any – in dealing with the heritage data added to the specific websites;
- we interviewed representatives of the ecclesiastical institutions (and of other entities involved in the projects examined) responsible for storing the geo-information in the inventories and for handling the processes associated with it.

4. The Church and the web: religious sites and their map representation

4.1 The UNBCE and its inventories

The Ufficio Nazionale Beni Culturali Ecclesiastici (UNBCE, National Office for Ecclesiastical Cultural Heritage) of the Conferenza Episcopale Italiana (CEI) started five projects with the intention to carry out a survey on its heritage and create "cultural commons" (Hesse, Ostrom, 2009; Di Giorgio, 2012; Caputo, 2013) freely accessible via the web. These projects represent a dialogue between the Church and the contemporary world and are based on common rules and qualitative standards recognized by a shared participation by different institutions on the basis of a principle of interoperability[4] of the stored data (Russo, 2015).
The web page http://www.chiesacattolica.it/beniculturali/attivita/00003744_Attivita.html shows, under the heading "Attività" (Figure. 1):

- CeiA (Cei Architettura): the inventory of diocesan churches[5];
- CeiOA (Cei Opere d'Arte): the inventory for religious "mobile" heritage;
- CeiBib (Cei Biblioteche): the inventory of religious libraries.
- CeiAR (Cei Archivi): the inventory of ecclesiastical archives;
- AICE (Anagrafe degli Istituti Culturali Ecclesiastici): the inventory of cultural ecclesiastical institutions[6].

FIGURE 1 – Home page of the Ufficio Nazionale dei Beni Culturali Ecclesiastici. On the right side: headings of the four CEI projects and the connected websites *BeWeb* and *Le Chiese delle Diocesi Italiane* (last download: 30.12.2015)

4 This is an internal interoperability among the inventories and an external interoperability in terms of relationship between different information systems that interact with the UNBCE (e.g. the collaboration with Wikipedia; Weston, 2015).

5 Abbey, cathedral, baptistery, library, bell tower, parsonage, chapel, church, cemetery, monastery, aedicule, museum, oratory, palace, sacred mount, sanctuary and seminary.

6 Archives, museums, libraries (D'Agnelli, 2011; see also: https://foederisarca.wordpress.com/tag/anagrafe-istituti-culturali-ecclesiastici).

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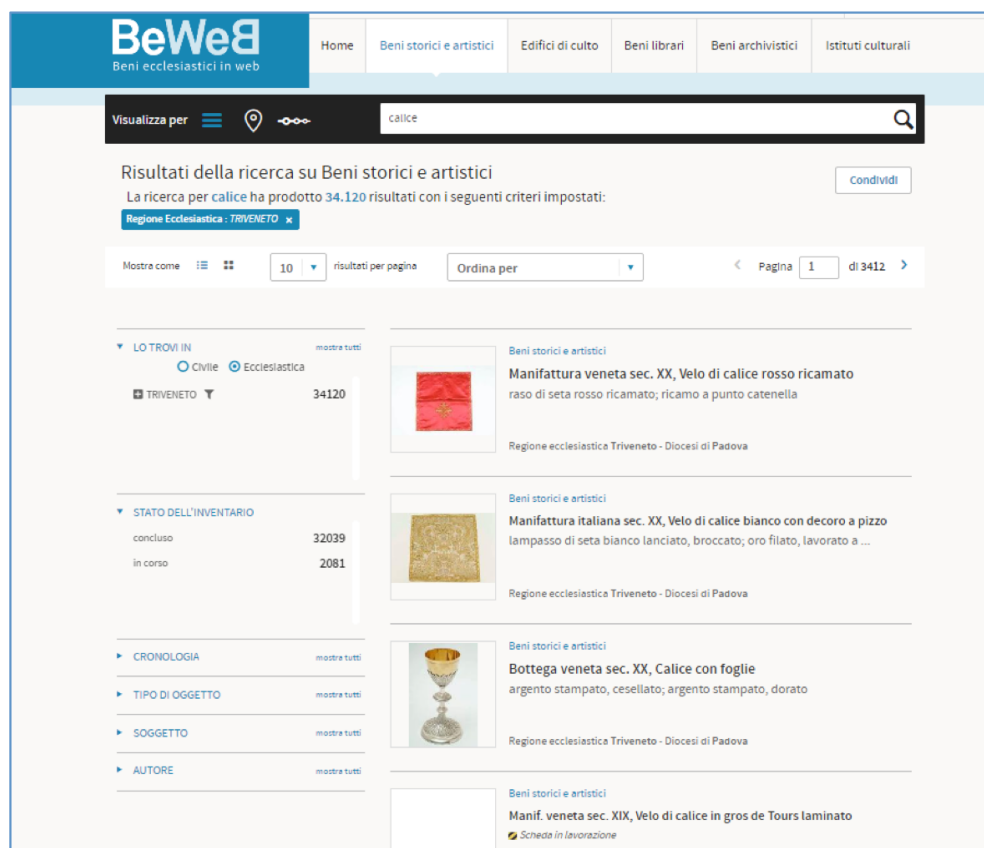
FIGURE 2
Example of a search by diocese: an object of artistic value (CeiOA)

In this paper we will refer to sacred buildings and artistic assets of CeiA and CeiOA. These projects are both linked to a computer system that allows the input of data concerning catholic cultural heritage in datasets. The forms that are available to fill in imitate the models created by MiBACT. CeiOA and CeiA in particular were initially inspired by the ICCD (Istituto Centrale per il Catalogo e la Documentazione[7]) and later integrated, maintaining key elements or characteristics typical of this kind of heritage. All data inputted are stored in the General Information System of the Catalog of MiBACT.

4.1.1 "Inventari e Censimenti" in BeWeb

These inventories are connected to "BeWeb"[8] (Parrella, 2015). The work started in 1997 and is still ongoing (Caputo, 2013; http://www.beweb.chiesacattolica.it/inventari/). More than 3,829,830 religious items[9] (http://www.beweb.chiesacattolica.it/) have been catalogued on BeWeb so far. The information related to them is made accessible to users by a Google-like search by diocese, type of object, type of sacred subject, author or chronology (Figure 2).

When examining the catalogue sheet, which appears on the screen when we individually analyze the heritage items from a geographical and cartographical point of view, we notice that no reference is made to the geographical context in which the heritage of interest is located: the only freely accessible information concerns the diocese the heritage asset belongs to. There is, however, a "contatta la diocesi" ("contact the diocese") tag

7 Central Institute for the Inventory and Documentation of the Italian Ministry of Heritage and Cultural Activities and Tourism (MiBACT).

8 http://www.beweb.chiesacattolica.it/it/ (last download: 2015.12.30).

9 On the website of BeWeb the following "numbers are cited": 224 involved dioceses, 3,829,830 historical and artistic items, 64,356 religious buildings, 596,792 books, 593 archives, 1,506 ecclesiastical institutions, 1,101 persons, families and insitutions, 472 glossary terms (last download: 2015.12.30).

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through which it is possible to ask for further information. This may be due to security reasons related to the heritage site and possible valuable movable assets contained in it (many assets are easily transportable). The lack of cartographic and/or geographic information is a limitation; geo-localizing the heritage would prove useful to allow tourists to enter the territory in which the site is located.
Maps can be found on the right side of the web page under the heading "esplora i beni per mappa" (find items through the map) choosing between the diocese boundaries or the administrative ones (Figure 3a). After selection, we can visualize the distribution of the grouped results with the cartographic representation of Google (Figure 3b). We can isolate single religious building by zooming in on their results. An interesting note is added at the bottom of the map: "Sono visualizzati solo edifici per i quali si dispone di una georeferenziazione esatta" (visualization is only possible for buildings that are exactly geolocalized). This implies that the cartographic procedure has been checked.

FIGURE 3a – Webpage of the map of the ecclesiastic regions of Italy
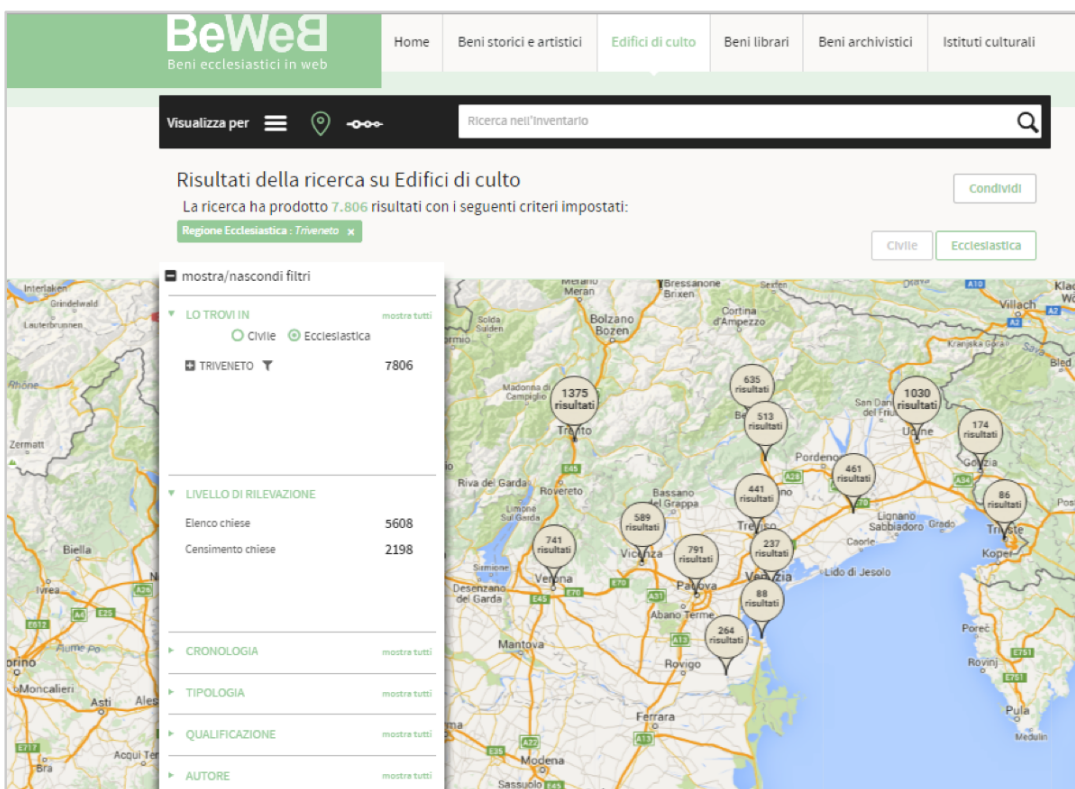
FIGURE 3b
Map with the results referring to the ecclesiastical region of Triveneto subdivided by dioceses

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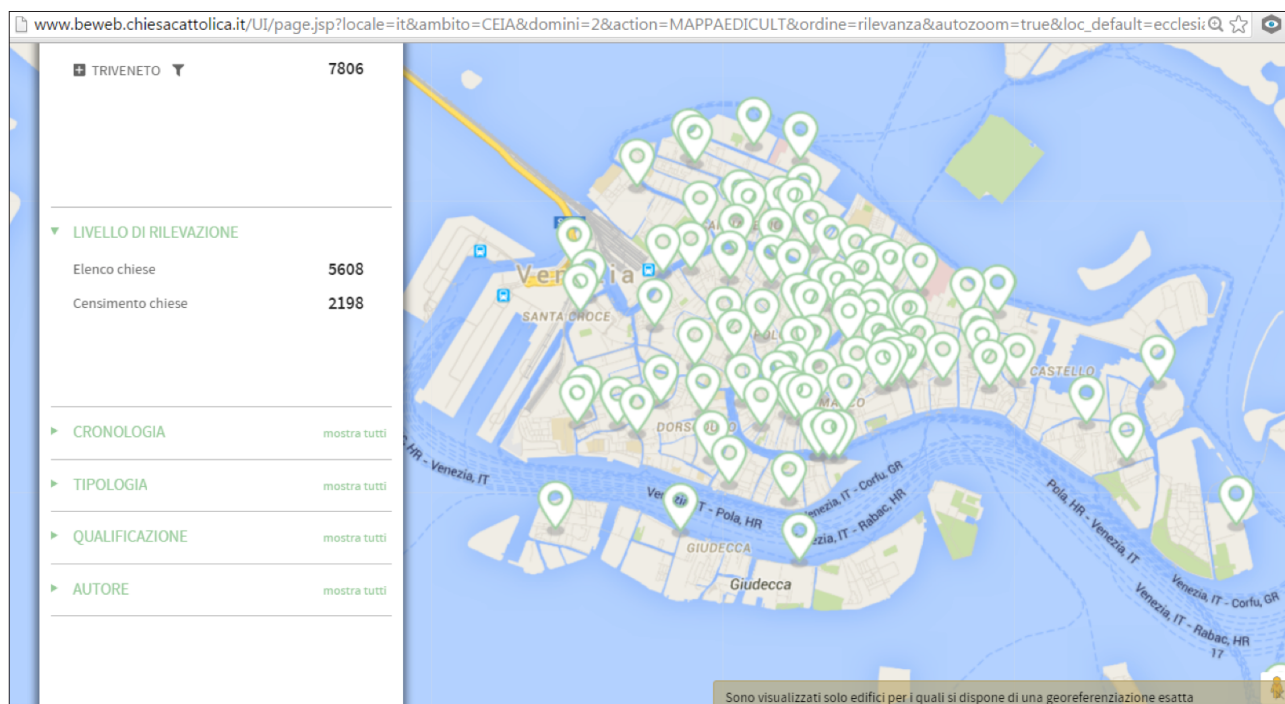
FIGURE 3c – Venice: examples of the religious buildings

4.1.2 CeiA and "Le Chiese delle Diocesi Italiane"

If we now examine the website of architectural heritage, the geographical mark changes. On the homepage of the CeiA: "Le Chiese delle Diocesi Italiane"[10] a guided search tool is available. A map of the Italian ecclesiastical regions allows anyone to find, by means of keywords, the desired item by ecclesiastical region[11], diocese[12], typology[13] or qualification[14] (Figure 4). The inventory covers many areas. Presently it includes 64,345 churches belonging to 217 dioceses and it provides the public with 10,373 "technical" sheets containing descriptions. However, this cataloguing exercise is still in progress (Gavazzi, 2013; Negri, Gavazzi, 2014). As soon as a single item is ready and validated, the record is made available on the internet. The description can be visualized either in a synthetic form or a detailed one.

Below we give an example of the results of a search. After indication of a preference (e.g. diocese of Bergamo, type: basilica), a list of religious sites is provided (Figure 5). On the right side of each record, there is a symbol with the shape of Italy on which to click. The user is then linked to the CeiA Web Map interface that runs with the virtual Bing-based globe, also on TerraItaly images (Figure 6). This clearly shows the important effort of geolocalizing all heritage sites included in the database. The very same localization is also given in a more "traditional" way in a textual version under the heading "collocazione geografico-ecclesiastica[15]". In this part, there are both the address of the site and the religious details based on the ecclesiastical administrative rules: region, diocese, parsonage and parish. Below this description, another map is placed: the Google Map

10 The churches of the Italian Dioceses: http://www.chieseitaliane.chiesacattolica.it/chieseitaliane/

11 In Italy there are 16 ecclesiastical regions.

12 There are 225 dioceses.

13 Namely: abbey, basilica, baptistery, library, bell tower, parsonage, chapel, church, cemetery, monastery, niche, museum, palace, oratory, sanctuary, holy mountain, ricetto, seminary.

14 See the website at the tag "scegli la Qualificazione".

15 Geographical - ecclesiastical localization.

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FIGURE 4 – Home page of the website "Le Chiese delle Diocesi Italiane" with the map of the ecclesiastical regions and the guided search (http://www.chieseitaliane.chiesacattolica.it/chieseitaliane/, last download: 07.10.2015)
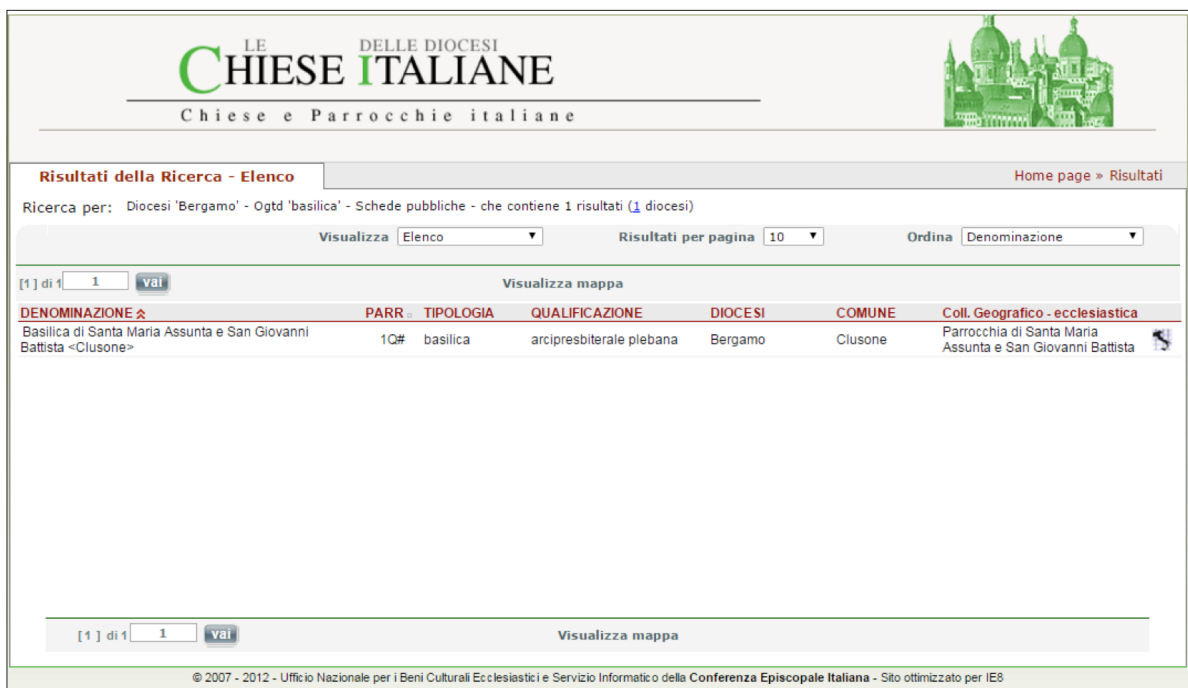
FIGURE 5 – Research output. The figure shows the output of the research of the "type" *basilica* in the *diocesi* of Bergamo. At the end of the string, the Italy-shaped button takes the user to the map of the site

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FIGURE 6
The satellite map of the Basilica of Santa Maria Assunta and San Giovanni Battista (Bergamo, Lombardia Region) visualized through the virtual globe Bing (an example)
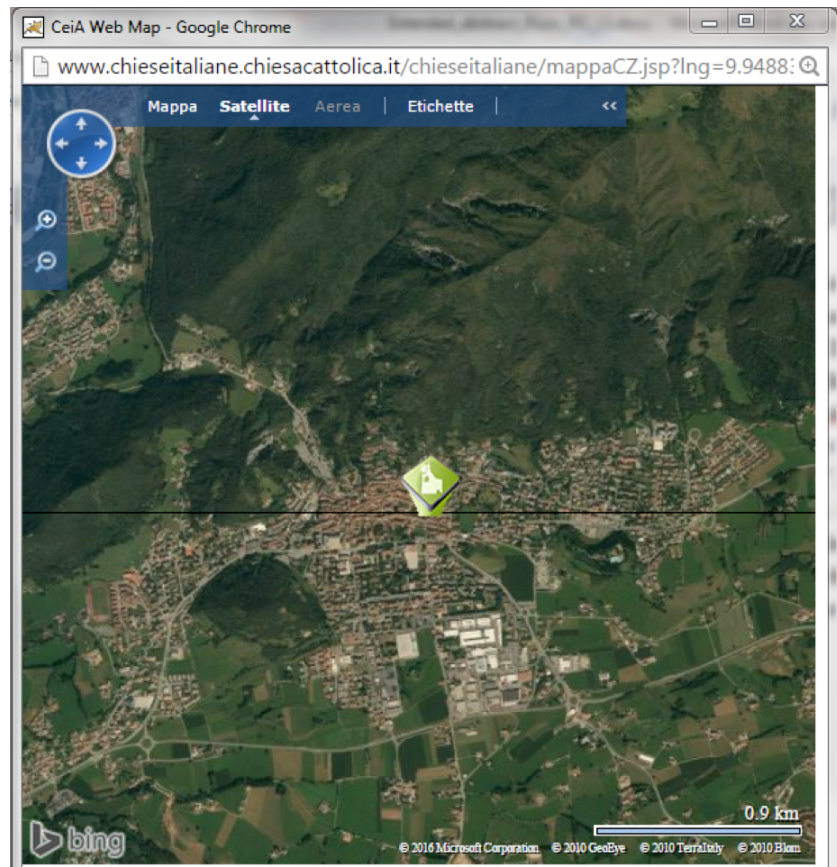
FIGURE 7
Personage of Clusone, Bergamo, Italy: Anagrafe Istituti Culturali Ecclesiastici

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FIGURE 8 – Anagrafe Isituti Culturali Ecclesiasticihttp://www.chiesacattolica.it/anagrafe/beniculturali/anagrafe/00016805_Anagrafe.html

of the surveyed religious buildings located in the territory of the ecclesiastical institution of the searched site (e.g. parsonage of Clusone for the basilica of Santa Maria Assunta and San Giovanni Battista in the diocese of Bergamo, Figure 7).

4.1.3 Anagrafe Istituti Culturali Ecclesiastici (AICE)

The Inventory of Cultural ecclesiastical Institutions (AICE) began as a consequence of the *Intesa sulle biblioteche ecclesiastiche*, which dates back to 18 Aprile 2000[16]. This inventory aims at giving visibility to archives, libraries and museums of the dioceses, and more. At the same time it represents a tool of their development, protection and a network between them[17].

Consulting the website of AICE, the following wording is evident: 1,494 published cultural institutes. This includes: 133 diocesan libraries, 352 non-diocesan libraries, 205 diocesan museums, 63 non-diocesan museums, 178 diocesan archives, 568 non-diocesan archives and 682 authorized to the management of users.

Once the scope of these initiatives is established, we can again see the aims: cartographic representation and communication. Regarding the other inventories, the home page of the website offers opportunity for the research. Here we can again find a map of Italy divided by region, and either the Italian ecclesiastical or administrative regions can be selected (Figure 8).

Before clicking on the map, the user has to decide whether to follow the basic research or the guided one. Whatever the option adopted is, the output is a list of

16 On May 18 2011, the XVIII GIORNATA NAZIONALE DEI BENI CULTURALI ECCLESIASTICI entitled “Archivi e Biblioteche ecclesiastiche a 10 anni dall’Intesa” (Church libraries and archives: 10 years after the Entente). See the webpage: http://www.chiesacattolica.it/beniculturali/formazione/00020758_Abstract_XVIII_Giornata_Nazionale_dei_beni_culturali_ecclesiastici.html (last download: 18.12.2015).

17 For further information see: http://www.chiesacattolica.it/anagrafe/beniculturali/anagrafe/00016816_Storia.html ((last download: 15.12.2015).

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items that can be visualized in Google through the tag "show the map". Upon clicking on the single point of interest (POI), the address of the item appears with the chance to visualize the POI in 3D through Bing (Figure 9a). The same choice is given if the user decides to enter the desired record of the mentioned list: always the 2D representation with Google Maps and the 3D visualization of Bing (Figure 9b).
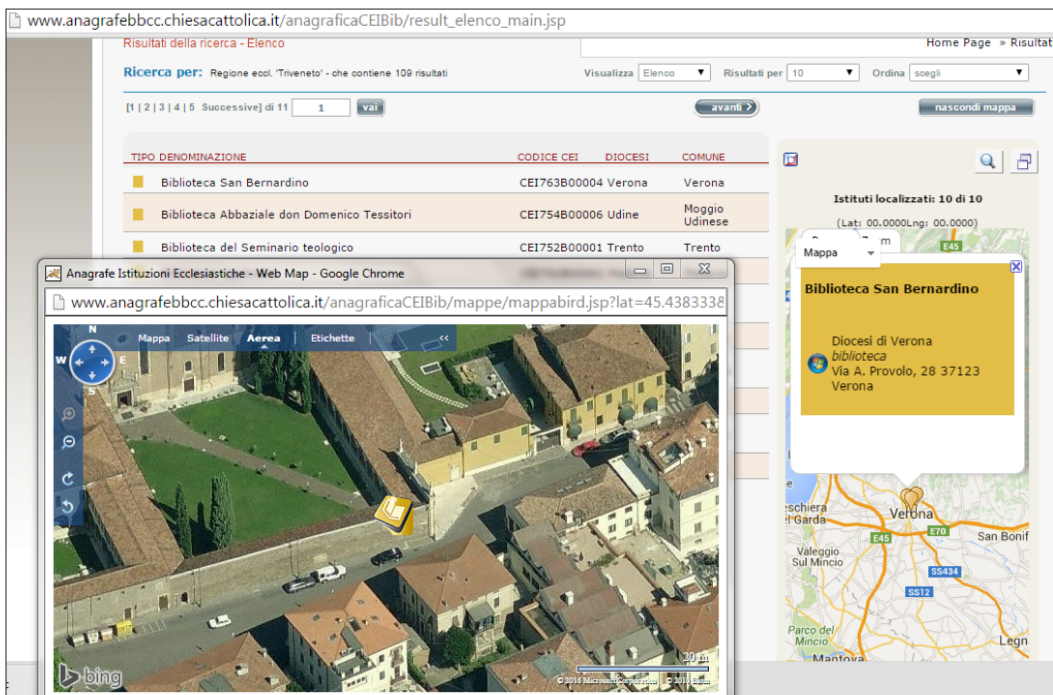
FIGURE 9a
Example of cartographic visualization of the output of a research in the AICE inventory: the library of San Bernardino in Verona
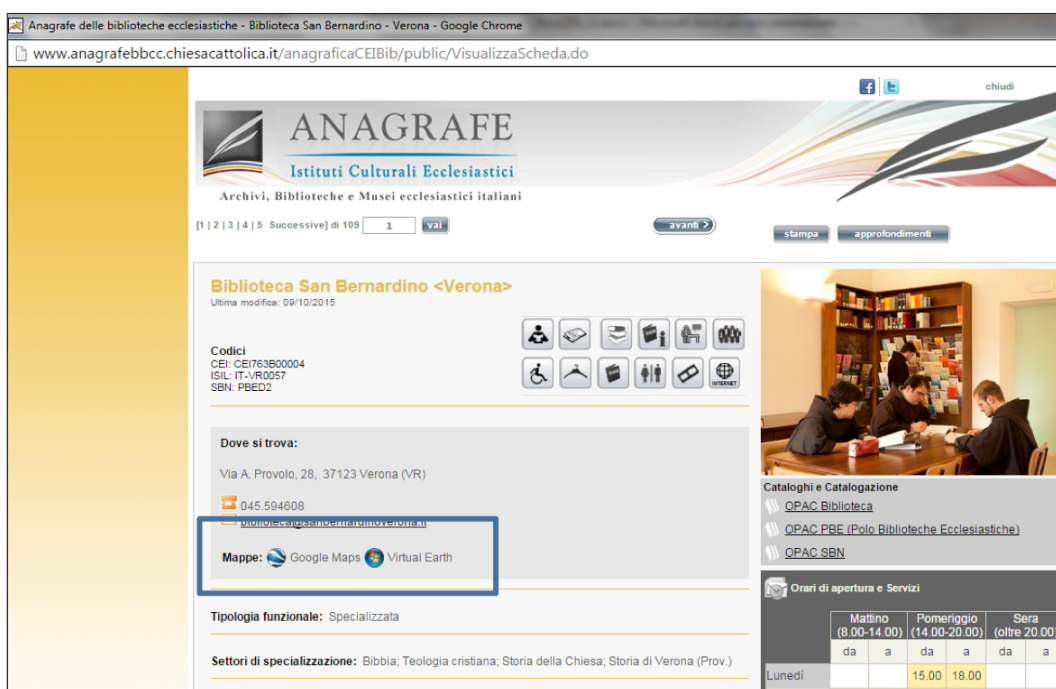
FIGURE 9b
The library of San Bernardino in Verona: the two options of Google Maps and Virtual Earth (Bing)

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4.1.3.1 APP AICE

In the aftermath of the communication "in mobility"[18] published in May 2015, the application of the Italian Church, namely *the Holy Bible* and *the Liturgy of the Hours*, was recorded to have had about 98,000 downloads (Rivoltella, 2015; Spadaro, 2015). This modern way of using mobile technologies by believers is well-suited for use with another app, namely the AICE app (http://www.chiesacattolica.it/appanagrafe/; Foederis Arca, 2015). It is an iOS- and Android-compatible application for smartphones and tablets. This app allows the user to navigate through the heritage of AICE, i.e. libraries, museums and archives. The list of these cultural institutes can be consulted in its homepage via the respective category. What is important – from a geographical point of view – is that the app follows the same scheme of the AICE website (§ 4.1.3), allowing a choice between ecclesiastical or administrative provinces. Once the desired POI is selected, the relative chart appears on the screen with all the details, including the coordinates (if on-line with the device). The app uses the website in a certain way, by taking advantage of the user's position, the app can display all the AICE items that can be found near his/her geo-localization.

4.2 A web atlas of the Italian parishes

Parrocchiemap.it is a website regarded as a web atlas (Mori, 2010). The database stores 25,710 records on parishes and 63,496 records concerning other churches and/or different ecclesiastical buildings. It is worthwhile mentioning that each church is linked to a map. The religious elements are geo-referenced in order to provide the correct localization of the religious POI. Created to provide believers with a calendar of available Masses, this website is useful for finding a church and also for planning an itinerary connecting different religious elements. Moreover, the user can be connected regardless of location thanks to the use of smartphones and mobile devices.

When visiting the home page, the user is able to search for a church by simply inputting the name of a diocese or the name of its municipality or both. The output is, for example, a list of churches of a given municipality, along with the complete addresses (Figure 10). The postal code is also given, which is an important element if the POI needs to then be inputted into a virtual globe (e.g. Google Earth) and thus facilitates easy access for the visitor.

After finding the church, the site allows its storage as a preference to create a route clicking on the flag in the upper left part of the picture of each church (Figure 10). Then, by using "Consulta l'itinerario" and choosing at least two churches, the web user can visualize the itinerary on Google Maps. The description of the route to follow is also given (Figure 11).

4.3 An example of a thematic survey: "Censimento Santuari Cristiani in Italia"

The inventory of the Italian Christian Sanctuaries represents the research output of an academic research project coordinated by Prof. Vauchez and entitled "Censimento dei santuari cristiani in Italia dall'antichità ai giorni nostri"[19] (www.santuaricristiani.iccd.beniculturali.it). Since 1998, a total of 30 Universities have been working on creating an internet-accessible database, whereby each sanctuary is presented on the basis of five macro areas of interest: 1) general, 2) architecture and artistic-historic data, 3) religious rituals, 4) references and 5) bibliography. An enormous amount of work has been carried out, part of it published[20] and some work still ongoing, carried out by the members of the Associazione Internazionale per le Ricerche sui Santuari (A.I.R.S.) (see their yearly conferences). The website is organized into four sections: public area, managing area, research area and vocabulary area. A tourist may be interested in the "public" area, where the

18 We can refer to a communication that overpasses the sense of place in that there is noneed to be in the same place to communicate with another person. It is enough – thanks to the information tools and technologies (i.e. mobile technologies) – to be connected through the internet (Rivoltella, 2015).

19 Survey of the Italian Christian Sanctuaries form ancient times to nowadays.

20 See note 17, p. 90: Rizzo L.S., Rizzo R.G., Trono A. *cit*. Up to now, besides the various proceedings mentioned here, dedicated books were published by numerous authors on Lazio (Boesch Gajano *et al*., 2010), Puglia (A.A.V.V., 2012), Rome (Boesch Gajano *et al*., 2012), Trentino-Alto Adige (Curzel, Varanini, 2012) and Umbria (Coletti, Tosti, 2013). Ongoing work on the remaining regions will soon be published.

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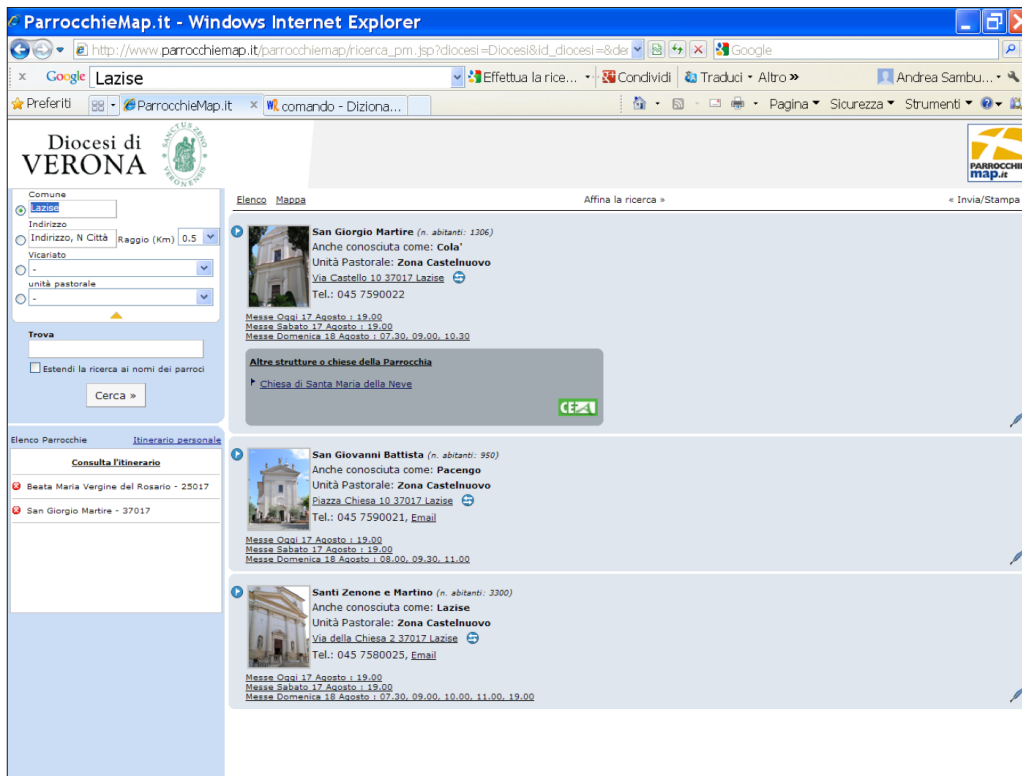
FIGURE 10
Example of the output of the research* of the churches: the parishes of the municipality of Lazise (Province of Verona, Italy).
The webpage shows how each element of the list has its own address and map.
On the left side of the page the string "Consulta l'itinerario" ("Consult the itinerary") is visible with two POIs stored using the flag

* The search is always connected with the diocese of the church
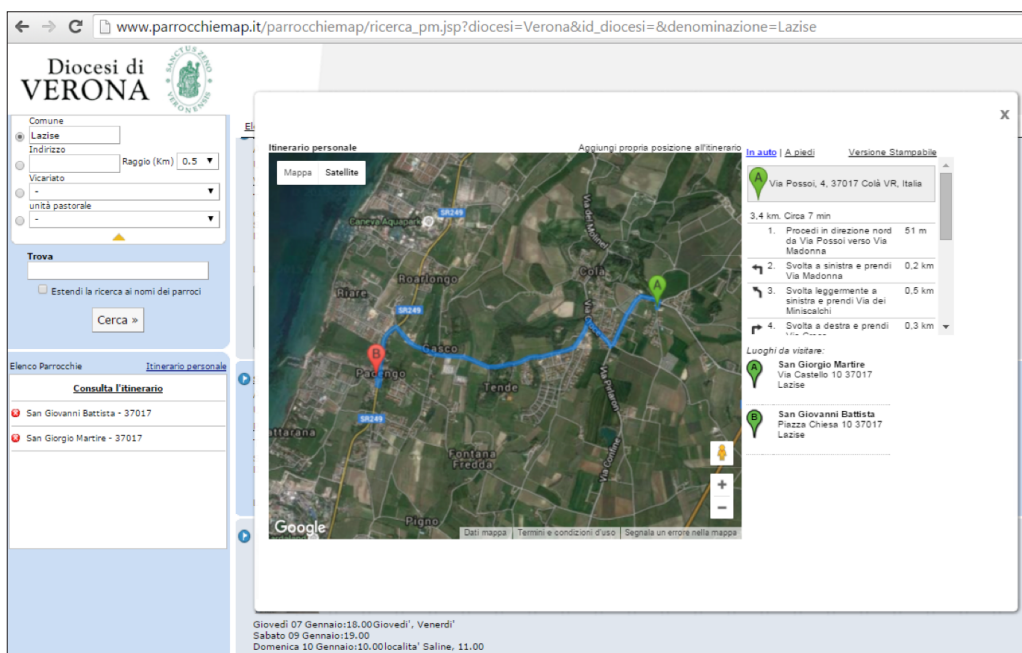
FIGURE 11
Output map of the route connecting two selected churches in the south of Garda Lake. At the right side of the page: in the upper part there is a description of how to follow the route and at the lower part the two religious POI are shown (listed as origin-destination)

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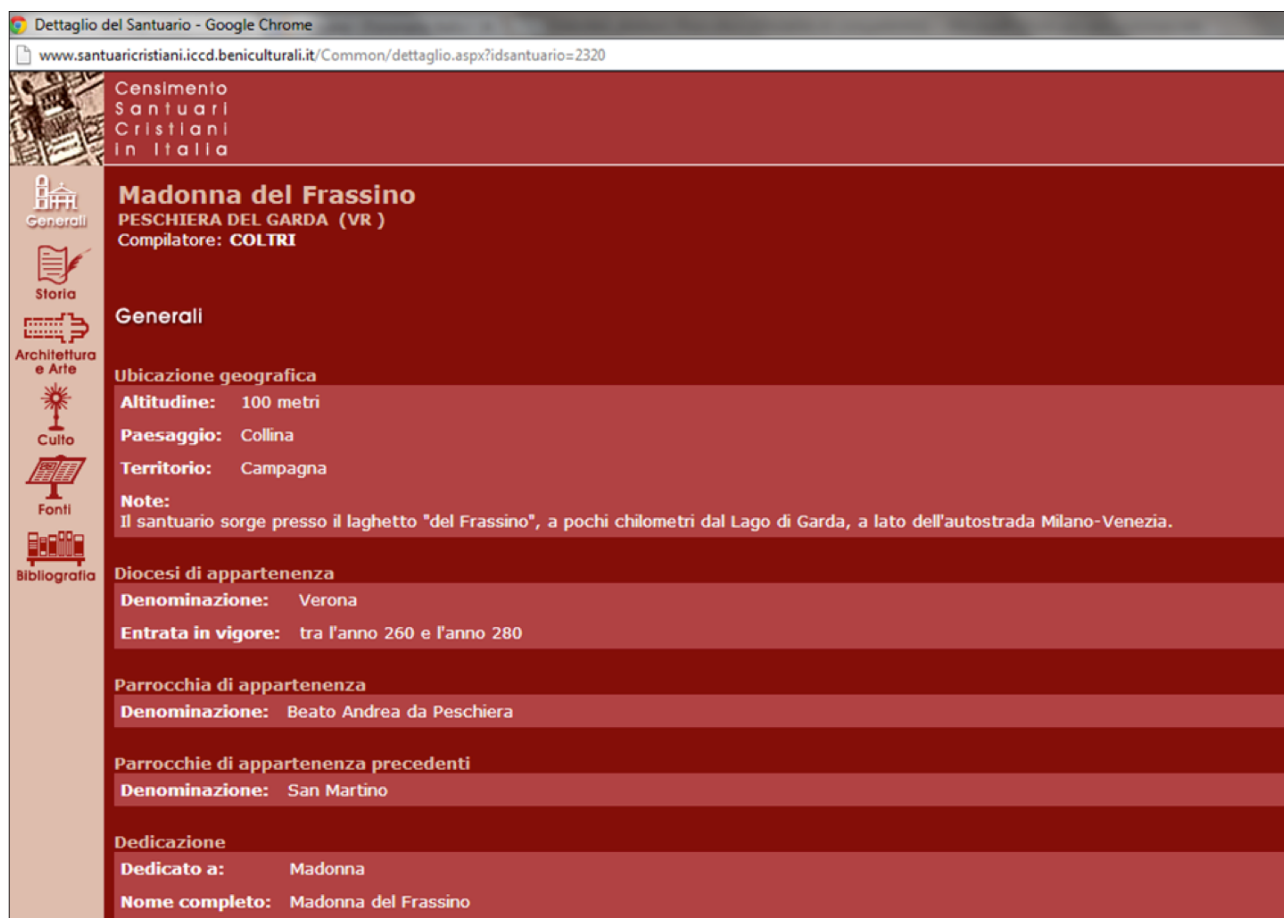
FIGURE 12 – Madonna del Frassino of Peschiera del Garda (Verona, Italy) sanctuary catalogued sheet (part of).
The figure shows the textual geographical localization of the sanctuary: 100 m high, hilly landscape, countryside territory

description of the selected sanctuary is given[21], and in the "research" area, which gives a list of the database fields that can be explored. The information collected, shown in Table 1, makes multiple queries possible. Regardless of the form of each place of worship selected, doubts only arise when visiting the first geographical part ("General"), where there is an inadequate localization of the sanctuary. This section should be integrated with the georeferenced information, where there is a short paragraph on altitude, landscape and territory. Misunderstandings could ensue in interpreting this section, for example, when researching on the Sanctuary of Madonna del Frassino of Peschiera del Garda (Province of Verona), the database gives us the following output (Figure 12):

- altitude: 100 meters
- landscape: hill
- territory: countryside.

The user has no means to localize the heritage site, not even its address.

Usually factsheets are richer in detail, even if they are not always precise. It is possible to find the coordinates of longitude and latitude or the reference of the IGM cartography or other ones. The latter is particularly hard for users to discover.

21 To get the output, the correct name of the desired sanctuary is required.

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TABLE 1 – Geographical items of the database obtained from the research area of the website. SOURCE: elaboration by the Authors

Macro geographical themes	Subthemes
Administrative	Municipality, province, region, diocese, present diocese, parish, present parish
Landscape	Wood, hill, river, sea, mountain, country area, lake
Territory	Plane, city, street, village
Sites linked to a not martyr saint	Home or life place, grave, with relics, memory sanctuary
Worship site	Cave, wood, peak, spring, river, tree
Origin of the pilgrims	Local, regional, interregional, international, not in use sanctuary

Conclusions

Location, space and time are key concepts when we consider geography and geographical information (Farinelli, 2003). Nowadays, the correct dissemination of geo-information linked to the aspect of geo-localization of territorial data is increasingly relentless. These data are communicated via numerous ICT tools, of which the internet plays a significant role. Web-mapping allows access to a very large amount of geographical data, which are sometimes of good quality, although not always adequate. The quality of such information is guaranteed by the institutions that work on the particular website, in our case, the Church and MiBACT. Even if their aims are slightly different, both offer free religious heritage information and take advantage of the potential of the internet. As a consequence, they implement the so-called "knowledge as a commons" (Hesse, Ostrom, *cit.*), or in this particular case "religious heritage knowledge as a commons". This is true even if this particular kind of heritage – religious sites – is not public and is mostly owned by the Church. Via the internet, such heritage becomes, in a certain way, "public". This is improved by a virtuous use of geo-localization. What we can now use and enjoy through the internet is the result of years of a huge amount of work in a choral multilevel commitment involving the Vatican/MiBACT, dioceses, and parishes/institutions in the use of both top-down and bottom-up processes; setting the census methodology on the one hand, the response, operation and voluntarism on the other. In this regard, the CEI also urges non-diocesan religious institutes, which usually have a rich cultural heritage, to be active and use the same methodology referred to above (Atzori, 2012). Furthermore, nowadays we are living in an era of digitalization of data, increasingly encouraged by EU strategies [COM (2011) 808, def.]. The Church follows its own mission of spreading knowledge related to its worship sites. However, at the same time, it connects to the rationale behind EU policies giving people plenty of information thanks to its decision to move from printed inventories to web-based ones. From a geographical and cartographical point of view in its websites, the Church makes an effort to use maps via virtual globes (Google Maps and Bing) to help the user in reaching the POI. The choice to combine ecclesiastical boundaries (ecclesiastical regions, dioceses etc.) with Italian ones (regions, provinces etc.) is interesting, though somewhat confusing as some people may not be familiar with them. The state-of-the-art in the map visualization is at the moment quite satisfactory. The catalog sheet of religious heritage sites nevertheless mainly focuses on information which is either historic or artistic in nature and could introduce a more appropriate level of contextualization of the site in the territory in which it is integrated (with links for example). In this case, more work should be done, also being inspired by the above-mentioned database of the sanctuaries (§ 4.3) and simply enhancing the key elements of the geographical disciplines *landscape* and *territory*. The above should be seen as a suggestion to further implement and complete the "religious heritage knowledge as a commons". However, these rich databases and websites are particularly useful for a variety of reasons to institutions or organizations such as Regions, Universities, Local Action Groups (LAGs), etc. or for individual users.

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Land Use/Cover Changes in Selected Regions in the World Volume IX

International Geographical Union Commission on Land Use/Cover Change
Charles University in Prague, Faculty of Science
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Land Use and Land Cover Changes represent important elements at the center of the geographical and cartographical analysis, as they allow understanding the effects of human – and natural – actions on the Earth, observing patterns and processes occurring in space and time. Such studies are therefore at the heart of the research carried on by geographers and cartographers, not only by those scholars that are more involved in the technical and operational aspects of remote sensing and image processing.

The International Geographical Union (IGU) hosts within its commissions one particularly dedicated to the topic of Land Use and Cover Changes (IGU-LUCC), chaired by Professor Ivan Bičík, from Charles University (Prague, Czech Republic). The Commission started in 2001 the production of a series of "Atlases of Land Use/Cover Changes in Selected Regions in the World", which is continuing and after 15 years managed to present more than 50 chapters concerning the dynamics of land use and land cover in different parts of the World. The Volume IX of the Atlas has its roots in 2013 after a meeting of the LUCC Congress in Cologne and takes the form of a monograph in which landscape changes are analyzed using different methods and covering different time frames. The Atlas consists of 11 chapters covering case studies from seven countries (Bulgaria, Czech Republic, Italy, Nigeria, Norway, Slovakia and Slovenia).

The Atlas hosts a chapter concerning Italy by some Italian Cartographic Association members. Particularly, "The impact of anthropogenic land use changes on the ecological quality of (selected) areas in Northern Italy" was written by Luca Simone Rizzo[1], Raffaela Gabriella Rizzo, Paolo Tizzani (pp. 19-32). The chapter, as it can be understood from the title, is mainly focused on a study area of Italy located in the North of the country, is introduced by an overview concerning the main trends in land use and cover changes intervened in Italy in the past 50 years, a useful insight to understand the framework in which the local analysis is performed. The chapter is therefore also characterized by a good set of references concerning the general situation of the country as of land changes.

After that, the chapter focuses on the characteristics of the study area and on the method used. In particular authors analyze the trends of land use affecting the study region of the provinces of Verona and Vicenza, particularly characterized by anthropization phenomena as soil impermeabilization, fragmentation, and consumption. The authors highlight the effects of anthropization on the region, characterized by high land consumption rates due to the persistent urban and anthropic sprawl, and that therefore is more at risk to impact on the equilibrium of the ecosystem.

The authors base their analysis on a comparison of the Corine Land Cover (CLD) data referred to two years,

1 Member of the Steering Committee (C12.26) of the International Geographical Union Commission on Land Use/Land Cover Change.

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as 1990 and 2006 and compare the effects in terms of land cover changes. Also, they analyze the urban planning instruments as programmed by the Veneto Region and the actions considered important in order to limit the effect of artificial land cover expansion by means of anthropic factors.

The chapter is interesting in providing readers with an insight into the Italian situation related to land use and cover change dynamics and their impact on ecological services. It does this particularly in attention to a part of the country that in more recent years has experimented a dramatic increase in the surfaces occupied by artificial elements, with negative effects in terms of fragmentation, impermeabilization and sprawl that, coupled with the changes occurred, above all, in climate in the most recent times, caused disasters to occur. The chapter is also interesting in observing how research and cartographic representation can help in supporting policy and planning to better understand the effects of certain political and economic decisions on territories. As a general comment, the Atlas is a valuable tool for providing, in different times and within its different editions, an insight into the 'state of the art' of the geographical representation of phenomena concerning spatial changes in different parts of the world, focusing both on local cases but providing also a more general framework on the situation of the different countries involved.

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Volume IX

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